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GENERAL VIEW
OF THE
AGRICULTURE
AND
MINERALS
OF
DERBYSHIRE;

WITH
OBSERVATIONS ON THE MEANS OF THEIR IMPROVEMENT.

DRAWN UP FOR THE CONSIDERATION OF
THE BOARD OF AGRICULTURE
AND INTERNAL IMPROVEMENT.

VOL. I.

CONTAINING A FULL ACCOUNT OF
The Surface, Hills, Valleys, Rivers, Rocks, Caverns, Strata, Soils,
Minerals, Mines, Collieries, Mining Processes, &c. &c.
Together with some Account of the recent Discoveries respecting the
Stratification of England; and a Theory of Faults and
Denudated Strata, applicable to Mineral
Surveying and Mining.

ILLUSTRATED BY FIVE COLOURED MAPS, AND SECTIONS
OF STRATA.

BY JOHN FAREY, SEN.
MINERAL SURVEYOR,
OF UPPER CROWN STREET, WESTMINSTER.

LONDON:
PRINTED BY B. McMILLAN, BOW STREET, COVENT GARDEN:
SOLD BY G. AND W. NICOL, BOOKSELLERS TO HIS MAJESTY, PALL-MALL; SHERWOOD, NEELY AND JONES, PATERNOSTER-ROW;
DRURY, DERBY; BRADLEY, CHESTERFIELD; AND
TODD, SHEFFIELD.

1811.

ADVERTISEMENT.

THE BOARD OF AGRICULTURE, in publishing this reprinted REPORT OF DERBYSHIRE, in an Octavo form, think it proper to state, that the BOARD does not consider itself responsible for the statements contained in the SURVEYS drawn up by their several REPORTERS; and that it will thankfully receive any additional information which may still be communicated.

N. B. *Letters to the Board, may be addressed to Sir* JOHN SINCLAIR, *Bart. M. P. the President, No.* 32, *Sackville Street, Piccadilly, London.*

PREFACE.

THE present Volume, is mostly the result of a Survey of the County of Derby and its environs, which was undertaken in the Summer of 1807, at the instance of the worthy President of the Royal Society, in order to examine minutely its Stratification and Mineral Treasures; and appears, in consequence of the President of the Board of Agriculture having, previous to my setting out on that Survey, engaged me to collect at the same time, the necessary facts and particulars for a Report to the Board, on the Agriculture and Rural Concerns of the County.

During that Autumn, and nearly all the two next years, I was employed, most industriously, in prosecuting my Survey.—When the whole County, and its environs, had been minutely gone over, (though some of the Mineral observations in the Coal Districts were yet unfinished, p. 162), and when some progress had been made in collating and arranging my voluminous materials; the consideration of the long period which must still intervene, before my intended *Mineral History*, and large *Map* of the District could be ready for publication, and the impatience of many to possess an abstract, at least, of the materials collected, led to a further arrangement in the Spring of 1810, with the President of the Board of Agriculture, for incorporating what appeared of the most general and useful nature, respecting the Stratification and Mineral Concerns of Derbyshire, into the first Chapter of my Report to the Board; and as the printed "Plan" prescribed by the Board to their County Reporters, for the sake of uniformity in the arrangement of the subjects in their several Reports, contained Sections and Heads in this Chapter for most of the subjects, the same has as much as possible been followed in preparing this first Chapter; which proving, when completed, of the full size for a Volume, the Board, in order to prevent the delay which would attend the completing of the whole Report, referred this for examination, and ordered it for immediate Printing and for separate Sale: conceiving, that thus, this and the succeeding Volume, would together furnish the usual information, on the Agriculture and Rural Affairs of Derbyshire, while the present Volume, by itself, might serve to other classes of Readers, as the first of the series of MINERAL COUNTY REPORTS, which the Board contemplated on its original institution * in

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* See "Communications to the Board of Agriculture," vol. I. Appendix, p. lxviii. or Philosophical and Geological Magazine, vol. 37, p. 8.

1793, and have never lost sight of, during the long period that they have been almost exclusively occupied on the Agricultural Reports, as of primary importance; the near completion of which now renders it desirable, that a specimen of what may be expected from a general research into our *Mineral Treasures*, and the Arts and Manufactures connected therewith, should be submitted to the Public, for consideration and further improvements, either respecting the arrangement, or the matter of such Reports.

The principal deviations which it has been found necessary to make herein, from the printed "Plan" of the Board's Reports, are, a long introduction to Section IV. on *Soils*, (pages 105 to 302), giving a general Theory of Stratified Masses, dislocated and cut, in all the varieties of the cases of each; also an account of Mr. *William Smith*'s Discoveries, a List of the South of England Strata ascertained by him, and a description of the Strata of Derbyshire, and of the small Map of them annexed (p. 97), &c.: likewise, a similar introduction to Section V. on *Minerals* (pages 313 to 340), giving an account of the searching, and preparing for the working of Mines, and of the principal apparatus used therein, &c.

Some of my Readers may perhaps be disposed to complain, of the want of precise Mineralogical Descriptions and Terms, in various parts of this

Report: to such I beg to observe, that the great object in this Volume has been, to state and shew the economic purposes, to which the various Mineral Products of these Districts are or may be applied, minutely to describe their several localities, and to ascertain and fix their places in the Series of British Strata, rather than in any Mineralogical System*: and the using therefore, as far as was practicable, of such terms as are known and understood, by *practical* Miners, Quarrymen, &c. in this and some other Districts with which I am acquainted, seemed of the first importance in such a Work as this, which is only to be considered as an abstract, of what I intend more fully to treat of hereafter; and I wish to state, that the time has not admitted, of arranging or referring to any of the numerous Specimens of the Minerals, &c. which I collected at the several Mines,

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* These, as they are supposed to approach perfection, contain places for every minute gradation of Minerals into each other, and of the mixtures and proportions of their elements: and hence, the more perfect or extended the system is, the less is its terms and distinctions applicable, to the naming of Assemblages of Strata; which contain in most instances, and even in the same stratum and bed, Minerals so distinct (of which ample hand-specimens might be taken, see p. 277), that the same observer at different parts of a stratum, or at a different time, and different observers of the same, would be perpetually giving new Names to the whole assemblage or stratum, which applied only to a part, or perhaps, to accidental or anomalous masses only, *in* some particular stratum.

Quarries, and places that I visited, but which I hope fully to describe hereafter, in my Mineral History; in which the Extraneous Fossils, as most important marks of the identity of Strata, will be particularly noticed: in the mean time, it is hoped, that the Synonyms and References given, and the copious *Index and Glossary* at the end, in the forming of which, as well as the Table of Contents and References, I have bestowed great pains, will render the whole easily intelligible, to most Readers.

The Names of particular Assemblages of Strata, and terms relating to Stratification, which I have given, or adopted from Mr. Smith, are doubtless some of them liable to objections; but I beg my Readers to consider, that the subjects of Terrestrial Stratification, and its accidents, are yet too little understood, to allow of a perfect Nomenclature, which can only result from a very advanced state of any Natural Science, the Abstract Sciences alone admitting, of perfect Definitions and Nomenclatures in the outset.

I cannot avoid here entering my protest, against the naming of Assemblages of Strata, or masses of particular *Substances*, with reference to their *ages*, or supposed invariable order of formation, being satisfied, that the vast Series of Strata of which the crust of the Earth is composed, presents numerous repetitions and successions or superpositions, in different parts of that Series, which

falsify

ducing its past History: let however, the ardent enquirer after truth be assured, that the pains he may take, to acquaint himself *fully* with the Geological facts, of the County, the Hundred, the Parish, or even a smaller District in some situations, wherein he may reside, will certainly be rewarded, by the means of trying the truth, of the most material parts of any Geological Theory which has or may be proposed; always remembering, that a Theory is certainly defective, and probably false, which can explain only part of the Phenomena; owing, to that divine, immutable and unbroken chain, which connects *all truths*, natural as well as abstract and moral. Yet let not the facts and correct observations of any Theorist, however wild part of his speculations may be deemed, be rejected and thrown aside, along with his Theory, but rather let such failures in accounting for ascertained appearances, stimulate all those who have the means, of minutely examining *all the facts* of the same or other similar Phenomena, to an unwearied search, after a Theory that shall connect them all, as doubtless such there is, however long it may lay concealed.

While these sheets were in the Press, I judged it right, to draw up a more extended summary view of the Stratification of England and Wales, in order to shew the connection of the Derbyshire Strata therewith, and explain somewhat more particularly than has been done herein, the effects of the great Faults and subsequent Denudations, whereby large adjoining tracts, bounded by these Faults, have been in very different degrees elevated, and stript of their proper upper Strata, in Derbyshire and five of the adjacent Counties: which I submitted, in a Letter, accompanied by a Sketch Map, to my liberal and able Patron, the President of the Royal Society, who was pleased to communicate them to that Learned Body, and in whose next Volume of Transactions, I have reason to expect that they will appear.

Many of the indications of doubt remaining (by a ?), as to the identity of the Gravel Rocks and Limestones of the Southern part of Derbyshire, have been added during the printing of the following sheets, in consequence of my having, in October last, examined some miles in length of the northern edge of the great South Wales Coal-field or Basin, spent two days with my able Friend Mr. Mushet, in the Forest of Dean Coal-field, and travelled thence across the Bristol and Bath (or Somersetshire and Gloucestershire) Coal-field; Districts which I had not previously seen, and whose under Strata, the grey Limestone Rock and very and variously coarse Grit Rocks in Red Marl, in particular, seem to point them out, as similar to the Ashby-de-la-Zouch Coal-field, and to suggest the probability, that what appeared to me, in a hasty examination of their weather-worn surfaces, perty connected with Minerals, the Profession or Pursuit, Collections, &c. and add the Post-Town of each, and the bearing of their Residence from such Post-Town, for more readily finding it on a Map. In my Preface to the 2nd Volume, I intend a similar List of acknowledgments to Agriculturists, Manufacturers, &c. for information more immediately relating to the contents of that Volume.

May, 1811. JOHN FAREY.

An Alphabetical List of those Persons who contributed their Assistance and Information towards the Contents of this Volume.

Agard, Francis, Iron Mills and Mine Owner, of Burrowash, near Derby, E S E.

Allen, Anthony, Mine Agent, of Winster, near Bakewell, S.

Alsop, Anthony, Mine Agent, of Wensley, near Bakewell, S S E.

Alsop, John, Mine Agent, of Lea Bridge, near Matlock Bath, S E.

Anderson William, Iron Agent, of Gras-moor, near Chesterfield, S E.

Andrews, Nicholas, Under-ground Agent and Sinker, of Hurst Brook, near Ashton-under-line, Lancashire, N E.

Arkwright, Richard, Esq. Mine and Lime-works Owner, &c. of Willersley Castle, near Matlock Bath, S E.

Arrowsmith, A. Map-maker, of Soho Square, London.

Bacon, Matthew, Coal and Iron Agent, of Morley-park, near Derby, N.

Banks, the Right Hon. Sir Joseph, Bart. Mine and Lime-works Owner, of Overton, near Chesterfield, SW.

Barber, Benjamin, Lead Smelter, of Bradwell, near Tideswell, N N E.

Barber, Thomas F. P. H. Coal-master, of Newthorpe Lodge, near Nottingham, N W.

Barker, George, Mine Owner and Lead Smelter, of Darley, near Bakewell, S E.

Barker, Thomas, Mine Owner and Lead Smelter, of Ashford, near Bakewell, NW—has a Mineral Collection.

Barker, Thomas, Coal Sinker and Borer, at Bollington Cross, near Macclesfield, Cheshire, N N E.

Barnes, George, Coal Sinker, of Dirty Hucknal, near Mansfield, Notts. WSW.

Barnes, John, Coal and Iron Master, Brampton, near Chesterfield, W.

Bayton, Samuel, Coal Agent, of Greasley, near Nottingham, NW.

Bennet, John, Cotton-Mill Agent, Electrician, of Mill-Houses, near Wirksworth, S. Min. Collect.

Bennet, Isaac, jun. of Over-Haddon, near Bakewell, SW.

Bevan, Benjamin, Civil Engineer, of Leighton Bussard, Bedfordshire. Min. Collect.

Bilsborough, — M. D. of St. Peter's, Derby. Min. Collect.

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Birket, William, Bar-master, of Bakewell.

Blore, John, of Callenge-low, near Bakewell, SW.

Booker, George, Coal and Ironstone Agent, of Chesterfield, see p. 163 Note.

Booth, John, Coal Agent, of Greenacres, near Oldham, Lanc. N E.

Bourne, John, Coal-master, of Eastwood, near Nottingham, NW. Min. Collect.

Brocksop, John, Coal and Iron Master, of Grass Hill, near Chesterfield, S E.

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Bullivant, Fletcher, Coal-master and Viewer, of Stanton House, Derbyshire, near Burton on Trent, Staffordshire, S.

Bullock, John, of Ashford, near Bakewell, NW.

Butler, Joseph, Iron and Coal Master and Viewer, of Killamarsh, near Chesterfield, N E.

Butler, Joseph, jun. ditto.

Buxton, — M. D. of Buxton, see p. 507.

Chambers, William, Collier, of Awsworth-Lane, near Nottingham, NW.

Charlton, John, Coal and Iron Agent, of Calow, near Chesterfield, E, see p. 163 Note.

Chesterfield, Earl of, Coal Owner, of Bradby Hall, near Ashby-de-la-Zouch, Leicestershire, NW. Min. Collect.

Chrishop, William, Surveyor, of Mansfield, Nottinghamshire.

Clayton, Benjamin, Coal Sinker, of Killamarsh, near Chesterfield, N E.

Coats, Jonathan, Surveyor, of Wirksworth.

Cocker, Samuel, of Ilkeston Hall, near Derby, N E.

Coke, Rev. Dewes, Coal Owner, of Brook Hall, near Alfreton, E.

Cottingham, John, at Hardwick-hall, near Mansfield, Notts. NW.

Cresswell, Robert, Drainer, of Iderich-hay, near Wirksworth, S.
Creswell, Thomas, Coal Agent and Sinker, of Belper, near Derby, N.
Curr, Benjamin, Coal Agent, of Ponds, in Sheffield, Yorkshire.
Devonshire, Duke of, Mine and Coal Owner, of Chatsworth House, near Bakewell, E. Min. Collect.
Dickin, George, Coal Agent, of Staveley, near Chesterfield, N E.
Dowland, James, Surveyor and Commissioner, of Cuckney, Nottinghamshire.
Edwards, Nathaniel, Coal and Iron Master, of Riddins, near Alfreton, S.
Ellison, Matthew, Agent, of Glossop, SW.
Ellison, Michael, ditto.
Evans, Isaac, Coal Agent, of Greenhill Lane, near Alfreton, S.
Eyre, Francis, Esq. of Hassop, near Bakewell, N. Min. Collect.
Faulds, Andrew, Coal and Iron Agent, of Worsborough, near Barnsley, Yorkshire, SS E.
Fearn, William, Mine Agent, of Brassington, near Wirksworth, W.
Fenton, William, Coal-master, of Rothwell-Haigh, Yorkshire, and (at George Inn) Alfreton.
Flint, Cornelius, Mine Agent, of Hartington, near Ashburne, N N W.
Froggat, John, Surgeon, of Eyam, near Stoney Middleton, NW.
Gauntley, William, sen. Surveyor, Commissioner, and Agent, of Bakewell.
Gauntley, John and William, jun. Surveyors, of Bakewell.
Gell, Philip, Esq. of Hopton Hall, near Wirksworth, W.
Gilbert, Joseph, Mine Agent, of Stanton in the Peak, near Bakewell, S S E.
Goodwin, George, Agent, of Butterley Furnace, near Alfreton, S.
Goodwin, Humphry, Coal-master, of Heath, near Chesterfield, S E.
Goodwin, William, Mine Agent, of Winster, near Bakewell, S.
Gould, Joseph, Surveyor, Commissioner, and Drainer, of Pilsbury in Hartington, Derbyshire, near Leck, Staffordshire, E N E.
Gratton, John, of Stubbing, near Chesterfield, SW. Mineral Map.
Greenough, George Bellas, Esq. M.P. No. 2, Parliament Street, Westminster. Min. and Geol. Collect.
Gregory, David, Mine Owner, of Middleton, near Wirksworth, N.
Gregory, Joshua, Mine Agent, of Middleton, near Wirksworth, N.
Greville, Rev. Robert, of Wyaston, near Ashburne, S.

Hackett, John, Lime-works, of Breedon, near Ashby-de-la-Zouch, Leicestershire, N E.

Hall, Elias, Fossilist, of Castleton, near Tideswell, N. Min. Collect. Models of Strata.

Hartop, William, Coal and Iron Master, of Park Furnace, near Sheffield, Yorkshire, N E.

Harvey, Joseph, Coal Agent, of Swadlingcote, near Burton on Trent, Staffordshire, S S E.

Haslam, George, Coal-master, of Swanwick, near Alfreton, S.

Heacock, Philip, Agent to the Duke of Devonshire, of Buxton.

Helliwell, George, Collier, of Paw Hill, near Penistone, Yorkshire, SW.

Hill, Rowland, Mine Agent, of Tideswell.

Holdship, Josiah, Miner.

Hopkinson, James, Coal and Iron Agent, of Wingerworth, near Chesterfield, S.

Howard, Samuel, Mine Agent, of Ashford, near Bakewell, NW.

Howe, Robert, Mine Agent, of Castleton, near Tideswell, N.

Howitt, Thomas, Coal Agent, of Heanor, near Derby, N E.

Hurt, Charles, sen. Coal, Lead Smelter, Sough, of Wirksworth. Min. Collect.

Hutton, Joseph, jun. of Ridgeway, Derbyshire, near Sheffield, Yorkshire, S E.

Jackson, Rev. Joseph, D. D. of Risley, near Derby, E. Min. Collect.

Jeffcock, John, Coal-master, of Darnal, near Sheffield, Yorkshire, E.

Jessop, William, sen. Civil Engineer, of Butterley-Hall, near Alfreton, S.

Jessop, William, jun. Coal and Iron Master, ditto.

Knighton, George, Coal Agent and Viewer, of Cotman-hay in Ilkeston, near Derby, N E.

Knowlton, Thomas, Botanist, Agent, of Edensor, near Bakewell, E. Min. and Botan. Collect.

Lee, Thomas, Miner, Sougher, of Crich Cliff, near Wirksworth, E.

Ling, Joseph, Coal Agent, of West-Hallam, near Derby, N E.

Lingard, John, of Great-rocks Lodge, near Tideswell, W.

Littlewood, William, Coal-master, of Hell-Car, near Sheffield, Yorkshire, N E.

Lloyd, John, Esq. of Wygfair, near Denbigh, N N W, in North Wales.

Longsdon, William, the late, Miner, and Lead Smelter, of Eyam, near Stoney Middleton, NW.

Love, Edward, Canal Agent, of Staley-Bridge, near Ashton-under-line, Lancashire, E.

Low, Abraham, Coal Sinker, of Bugsworth, near Chapel-en-le-Frith, NW.

Lowry, Wilson, No. 57, Great Titchfield Street, Oxford Street, London. Min. Collect.

Mammatt, Edward, Coal-master, of Measham, Derbyshire, near Ashby-de-la-Zouch, Leicestershire, SW. Min. Collect.

Manlove, Edward, Drainer, of Norris Hill, near Ashby-de-la-Zouch, Leicestershire, W.

Marriot, Godfrey, Collier, of Pinxton, near Alfreton, E.

Marriot, John, Collier, of South Normanton, near Alfreton, E N E.

Martin, William*, the late, of Macclesfield, Cheshire (Author of "Outlines of the Knowledge of Extraneous Fossils," and "Petrifactions of Derbyshire," vol. I.).

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* I have to regret exceedingly, in common with all well-wishers to Geological Science, the premature loss of this very ingenious Naturalist, and particularly, that I did not earlier become acquainted with him, before declining health unfitted him for much exertion in the Field; considering then, however, his indisposition to be but temporary, I had arranged with him a Plan of mutual co-operation, by which my intended Natural History would have had the benefit of referring, in my descriptions of the several *Strata* of Derbyshire, to his coloured Engravings and scientific Descriptions of the Organic Remains or *Reliquia* peculiar to each bed or stratum, and his descriptions would have had a higher degree of Geological interest given them, by *the place* (or places) *in the Series of Strata being exactly ascertained, to which they each belonged*, and their localities being fixed, by means of my large Mineral Map: in furtherance of which arrangement, I had prepared a copy of my Coloured Map of the Limestone Strata, for Mr. Martin's use, in revising and ascertaining the more exact localities of those Reliquia already published, and collecting and preparing others, for his future volumes; and we had appointed to meet, at our worthy Patron's at Overton Hall, in September 1809, but alas! increasing illness and death prevented my seeing him a second time: and I lament to add, that his Widow and Orphan Children, appear to be left in indigent circumstances, and are proper objects of commiseration and assistance.

Meadows, James, Canal Agent, of No. 24, Piccadilly, in Manchester, Lancashire.

Melland, Francis, Mine Agent, of Alport, near Bakewell, S.

Millington, Isaac, Borer and Coal Agent, of Ripley, near Alfreton, SW.

Milnes, John, Mine Owner, Lead Smelter, and Lime-works, of Ashover, near Chesterfield, SW, page 386.

Milnes, William, sen. Mine Owner, Agent, of ditto. Min. Collect. Section.

Milnes, William, jun. of ditto.

Moorhouse, John, Surgeon, of the Market-Place in Sheffield, Yorkshire.

Morewood, Rev. Henry Case, and Mrs. Morewood, Coal Owners, of Alfreton.

Mosley, Sir Oswald, Bart. Coal Owner, of Rolleston, near Burton, Staffordshire, N.

Moss, Robert, of Moseley, near Ashton-under-line, Lancashire, N E.

Mundy, Edward Miller, Esq. Coal-master, of Shipley, near Derby, N E.

Mushet, David, Coal and Iron-master, late of Riddings, near Alfreton, now of Coleford, in the Forest of Dean, Gloucestershire. Analysis and Min. Collect. pages 393, 399, &c.

Nadin, William, Coal-master, of Stanton-ward, Derbyshire, near Burton on Trent, Staffordshire, S.

Needham, Ellis, Cotton Mills, &c. of Hargate-wall, near Tideswell, W.

Nuttall, George, Surveyor, late of Matlock, now of Hampton-Court, near Leominster, Herefordshire, S E.

Nuttall, John, Surveyor and Commissioner, of Matlock, near Matlock Bath, N E.

Oakes, James, jun. of St. Peter's, Derby.

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Otter, Rev. Edward, Draining, of Bolsover Castle, near Chesterfield, E.

Parkin, William, Coal Sinker and Borer, No. 36, Old Street, in the Park, Sheffield, Yorkshire, see p. 164 Note.

Parkinson, James, of Hoxton Square, London (Author of "Organic Remains," 3 vols.). Min. Collect.

Parramore, George, Coal Agent, of Brinsley, near Nottingham, NW.

Pearson, Thomas, Fossilist, of Matlock Bath. Min. Collect.

Pearson, Thomas, Coal-master, of Herringthorpe, near Rotherham, Yorkshire, S E.

Pidcock, Rev. Benjamin, of Yolgrave, near Bakewell, SSW.

Poie, Sacheverel Chandoise, Esq. Lime-works, of Radburne Hall, near Derby, W.

Pontey, William, Nurseryman, Planter, and Pruner, of Huddersfield, Yorkshire, page 306.

Potter, James, Coal-master, of Ilkeston, near Derby, N E.

Potter, Peter, Surveyor, of Trafalgar Terrace, Kentish Town, Middlesex.

Radley, John Lees, Coal Agent and Viewer, of Werneth Colliery, near Oldham, Lancashire, W.

Ranshaw, Joseph, Coal Agent, of Norbrigs in Staveley, near Chesterfield, N E.

Rawlinson, Henry, Coal Sinker, of Eckington, near Chesterfield, N N E.

Rawlinson, Thomas, Coal Sinker, of ditto.

Roberts, Charles, Bar-master, of Winster, near Bakewell, S.

Robinson, James, of Pygrove in Glossop, S E.

Rode, Cornelius Heathcote, Esq. Coal Owner, of Barlborough, near Chesterfield, N E. Min. Collect.

Rose, Elias, Collier, Hoodsfield Lane, near Macclesfield, Cheshire, N E.

Royse, Jeremiah, Mine Agent, of Castleton, near Tideswell, N.

Samples, John, Drainer, of Belton, near Loughborough, Leicestershire, NW.

Sandars, Francis, Surveyor, of Mackworth, near Derby, WNW.

Sandars, John, Surveyor and Commissioner, ditto.

Saxleby, Thomas, Mines, and Lead Smelter, of St. Peter's, Derby.

Scholefield, Edward, Lime-works, of Barlborough, near Chesterfield, N E.

Sherwin, William, Agent, of Wirksworth.

Siddal, Godfrey, Coal Sinker, of Brimmington, near Chesterfield, N E.

Siddal, James, Coal Agent, of Clough-Hall, near Congleton, Cheshire, S SW.

Silverwood, Theodore, Coal and Iron Agent, of Somercotes, near Alfreton, S E. Section.

Sitwell, Sir Sitwell, Bart. Coal Owner, of Renishaw Hall, near Chesterfield, N E. Min. Collect.

Smedley, John, Coal Agent, of Bretby Inn, near Ashby-de-la-Zouch, NW.

Smith, Ebenezer, Coal and Iron-master, of Chesterfield.

Smith, Samuel, Iron-master, of Sheffield, Yorkshire.

Smith, William, Agent, Lime-works, of Swarkestone-Lows, near Derby, S.

Smith, William, Civil Engineer and Mineral Surveyor, No. 15, Buckingham Street, Strand, London. Geological Collect. see page 108.

Smith, William, Coal Sinker, of Aston, near Rotherham, Yorkshire, S E.

Smithson, William, Esq. of Heath, near Wakefield, Yorkshire; E. Min. Collect.

Sowerby, James, of Mead Place, near the Asylum, in Lambeth (Author of "British Mineralogy," &c.) Min. Collect.

Staley, Thomas, Coal Agent, of Butterley, near Alfreton, S.

Staley, William, Mine Agent, of Winster, near Bakewell, S.

Stanley, John, Stone Quarries and Saw-mill, of Nether Langwith, near Cuckney, Nottinghamshire, WSW.

Stanley, Sir John Thomas, Bart. of Alderley-park, near Macclesfield, in Cheshire, NW.

Stephenson, John, Coal and Iron Agent, of Kimberworth-park, near Rotherham, Yorkshire, NW.

Stevens, William, of Chatsworth House, near Bakewell, E. Min. Collect.

Stokes, Dr. Jonathan, sen. M. D. Botanist, &c. of Chesterfield. Min. Collect.

Street, John, Coal Agent, of Grin, near Buxton, SW.

Strutt, George Benson, Coal-master, Cotton-mills, &c. of Belper, near Derby, N.

Strutt, Joseph, Cotton-mills, &c. of St. Peter's, Derby.

Strutt, William, Cotton-mills, &c. of St. Alkmund's, Derby. Min. Collect.

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Sylvester, Charles, Lecturer, &c. of St. Alkmund's, in Derby.

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Taylor, John, Mine Agent, of Wensley, near Bakewell, S S E.

Thompson, Francis, the late, Engineer, of Ashover, near Chesterfield, SW.

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Tissington, George, Mine Agent, of Orchard-wood, near Battle, in Sussex.

Tomlin, Robert, late of Chatsworth, now of Knowchley, near Stoney Middleton, E N E.

Toplis, George, of Brassington, near Wirksworth, W.

Tudor, Samuel, Coal Agent, &c. of Coxbench-Hall, near Derby, N.

Turton, Job, Coal Agent, of Inkersall Green, near Chesterfield, N E.

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Wager, William, Mine Agent, of Little Longsdon, near Bakewell, N W.

Wainwright, Samuel, Collier, of Tibshelf, near Alfreton, N E.

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Walker, Thomas, Coal-master and Viewer, of Nether Green in ditto, and Bilborough, ditto, W N W.

Walker, William, Coal Agent, of Bilborough, near Nottingham, W N W.

Watson, White, Statuary and Fossilist, of Bakewell. Min. Collect. Tablets, see p. 165 Note.

Wells, Richard, Coal-master, of Eckington, near Chesterfield, N N E.

Willoughby, Miss Frances, Bleacher, &c. of Higham, near Alfreton, N W. The late Dr. Willoughby's Min. Collect.

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Woodhouse, Jonathan, Engineer and Coal and Iron Agent, of Overseal-Cottage, near Ashby-de-la-Zouch, Leicestershire, W S W.

Woodward, William, late Coal Agent, of Stanton by Dale Hall, near Derby, E N E.

Wright, John, Mine Agent, of Wirksworth.

Wyatt, William, Mine Agent, of Foolow, near Stoney Middleton, W N W.

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ERRATA AND ADDITIONS.

[In compiling the Contents and Index, and making numerous other references and comparisons of the following Sheets and the Maps, since they were printed off, several omissions and errors were detected, which Mr. M'Millan, the Printer, could take no cognizance of, or correct, as the Work proceeded, who has throughout cheerfully seconded my endeavours (as Mr. Neele has also done with respect to the Plates), to render the Work as correct and as complete as possible. I should not have thought it right, to let this opportunity slip, of supplying the most material of such omissions, along with the corrections which appear necessary.—*J. F.*]

Page 6, line 5, for *Der-*, read Dar-.
8, — 5 from bottom, for *Seven*, read Six.
12, — 5 and 6, for *WNW* and *E S E*, read E S E and WNW.
— 15, for *Thringstone*, read Thringston.
— 19, for 18, read 38.
13, — 3, for 74, read 87.
— 4 from bottom, for (*Green*), read Blue.
16, — 11 from bottom, before *E*, insert, No. 66.
— 9 ditto, before *on*, insert, No. 40.
17, — 17, for *Gravel*, read Rubble.
— 9 from bottom, after *quarry*, insert, Hill.
19, — 1, after *Hill*, insert (Wethericks); and for *Lime*, read Toadstone.
23, — 6 from bottom, for *Brislincote*, read Brislingcote; and for 60, read 10.
——— bottom line, for 46, read 45.
24, — 10, for 83, read 33.
25, — 4 from bottom, for *Pentridge*, *7th*, read Pentrich, 11th.
26, — 13, after *Chert*, insert, &c.
27, — 14 from bottom, for *S*, read N.
— 11 from bottom, for *on*, read W of.
28, — 20, for 92, read 93.
— 21, for *Combs*, read Combes.
29, — 18, for *Derwent*, read Darwent.
— 23, after *as*, insert Thorpe Cloud.
31, — 1, for *Dov*, read Dove.
— 5 from bottom, for *No.* 2, read No. 3.
32, — 6, for *on*, read W of.
33, — 11, after *Plate V.* insert, p. 129.
34, — 20, for *on*, read W of.
35, — 11, for *Gresley*, read Greasley.
36, — 19, after *Grit*, insert, high.
37, — 9 from bottom, for *12th*, read 13th.

Page 37, line 8 ditto, for *East*, read West.
38, — 16, for *igh*, read High.
40, — 11 from bottom, after *Ridge*, insert, a Lead Hearth.
42, — 17, for *Kerridge*, read Kerredge.
——— at bottom, insert, Knot Low, SW of Tideswell, 3rd Lime, No. 20, W of East Wye Ridge.
44, — 1, for *Long*, read Long-cliff.
— 16, for *on*, read E of.
46, — 21, for *on*, read W of.
48, — 10 from bottom, after *Grit*, insert, No. 24.
8 from bottom, for *on*, read W of.
50, — 20, for *on*, read S of.
53, ——— after line 12 from bottom, insert, Scrat Tor, NW of Great Longsdon, 1st Lime, No. 29, W of East Wye Ridge.
— 3 from bottom, for *Seven*, read Six.
54, — 18, for *on*, read W of.
55, ——— after line 12, insert, Six Hands (see *Seven* Hands, by mistake).
— 13, for *Dowey*, read Doway.
— 14, after *Ridge*, insert, an old Lead Hearth.
57, — 14, for *Strelly*, read Strelley.
58, — 3, for *Swarkstone*, read Swarkestone.
59, — 11 from bottom, for *4th*, read 14th.
62, — 4 from bottom, for *on*, read E of.
64, — 18, for *Berrisford*, read Beresford.
78, — 16 from bottom, for *Ormaston*, read Osmaston.
81, ——— after line 23 *(Bretton)*, insert, Foolow.
82, — 6, for *Alport*, read Alpert.
87, ——— before line 4 from bottom *(Wooley)*, insert, Woodthorp.
109, ——— at bottom of Note, insert, page 175 Note.
114, — 4, after *Portland*, insert a, ?
— 9 from bottom, for *Wigstead*, read Wigston.
— 2 from bottom, after *Abertbaw*, insert a, ?
121, — 20, for *those*, read these.
132, — 8, after *Walsall*, insert a, ?
144, ——— at bottom, insert, Stoney-lee Common, SE of Yolgrave (coarse Shale Grit).
148, — 17, for *Colwich*, read Colwick.
150, — 8 from the bottom, after *nodules*, insert a, *; and a Note at the bottom of the page—

* Mr. Jameson, a Writer on the Geognosy of M. Werner, when speaking of the Gypsum of Derbyshire, says, that the Formation to which it belongs is unknown, "as no *well educated* Geognost has ever communicated any observations regarding it."

151, — 6, after *Newark*, insert, (Beacon Hill).
156, — 18, for *Strelly*, read Strelley.
157, — 19, before *Clay*, insert, or redish.
——— bottom line, for *Scolefield*, read Scholefield.
— 1 from bottom of Note, for *Smeeton*, read Smeaton.
158, — 14, for *Strelly*, read Strelley.
— 7 from bottom, after *measures*, insert a, ?
159, — 12, after *Limestone*, insert a, ?
— 17, after *measures*, insert a, ?
164, — 3, after *Hall*, insert, around Golden-Valley and Riddings.
171, — 10 from bottom, after *Chapel*, insert, in Yorkshire.
172, — 4 from bottom of Note, for *Goytes*, read Goyte.

Page 174, line 7, after *Fault*, insert a, ?

175, — 3, for *Ochry*, read Ochrey.

177, — 9, for *Richard*, read Edward.

185, — 11 from bottom, after *Benty-field*, insert, Bramley-moor.

190, — 4 from bottom, for *Smithey*, read Smithy.

201, — 6, for *Hollingwood*, read Hollinwood.

218, — 18, after *Beds*, insert, and Balls.

221, — 8 from bottom, after *Lea*, insert, -wood.

226, — 5 from bottom, for *SW*, read SE.

228, — 4, after *Grit*, insert, and that it also appears in Stanton Town.

237, ——— Note, line 1, for *this Section*, read, the original of this Section in the Phil. Mag. (the lowest Toadstone being here made rather too thick, by the Engraver).

249, ——— at bottom of Note, add, The Wayboards squint the thin Veins, see p. 245.

253, — 6 from bottom, for *Breach*, read Bright.

291, — 3 from bottom of Note, after *appear*, insert, near Row-Dale and.

299, — 9, after *works*, insert, and N E of New Haven, for Ecton Cupolas.

307, — 2 of Note, after *mentions*, add (see W. Nicholson's British Cyclopædia, art. CHALK).

310, — 12 from bottom, for *enters*, read enter.

311, — 12 from bottom, for *grows*, read grow.

325, — 16, after *Sinkers*, insert, This apparatus, appears to be the invention of Mr. William Brunton, who has lately presented an account thereof to the Society of Arts, that will appear in their next Volume of Transactions.

329, ——— after line 21, insert, Dale, S E of Warslow, Staffordshire, in Shale Limestone and Shale, now driving.

339, ——— at bottom, insert, see Phil. Mag. vol. 37, p. 310.

348, ——— catch-word at bottom, for *Derby*, read Denby.

349, — 1, for *Derby*, read Denby.

350, — 8 from bottom, before *a*, insert, is.

393, — 11, for *Mushett*, read Mushet.

398, — 7, for *Pantalogia*, read Pantologia.

399, — 5 from bottom, for *Mushett*, read Mushet.

402, — 2 of Note, after *Veins*, insert, and Flat-works.

— 3 of Note, after page 131, insert, and Bath Society's "Letters and Papers," XII. p. 94.

414, — 13, for *4th*, read 3rd.

415, — 4, after *known*, insert, and is improperly stated by Mr. W. Forster (Treatise on a Section of Strata, p. 45) to occur in the place of the 1st Coal-shale, in Derbyshire, see p. 237 Note.

414, — 13, for *4th*, read 3rd.

421, — 14, after 414, insert, and 274.

427, — 13, for *Mr. Evans*, read, Messrs. Evans and Co.

447, — 9, for 110, read 148.

449, — 13, after *Crich*, insert, (Carr).

457, — 9, for *Che-*, read Stafford-.

460, ——— last line but one, after *head*, insert, (Tigre-stone).

504, ——— at bottom, insert, in 2nd Toadstone, see Pilk. I. 263 and 264.

512, — 14 from bottom, for *Slack*, read Sleck.

AGRICULTURAL SURVEY
OF
DERBYSHIRE;
INCLUDING THE
MINERAL
STATE THEREOF.

CHAP. I.

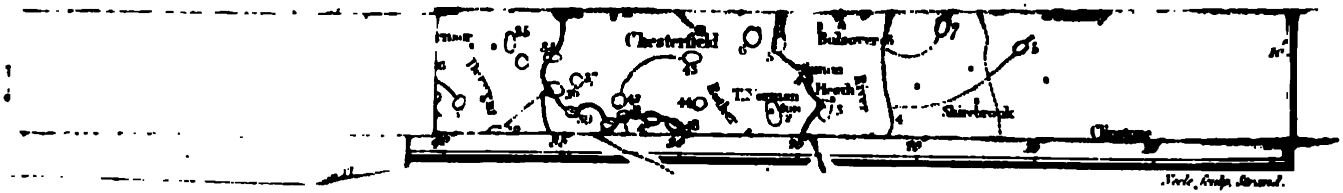
GEOGRAPHICAL STATE AND CIRCUMSTANCES OF THE COUNTY.

SECT. I.—SITUATION, FORM, AND EXTENT.

DERBYSHIRE is an Inland County of England, of considerable extent, computed to be the twentieth in the order of Magnitudes of the English Counties, and the nineteenth in the order of their Population. It is situated about between the parallels of 52° 58′ and 53° 27′ of North Latitude, and between 1° 12′ and 2° 3½′ of West Longitude, from Greenwich Observatory: its most southern extremity being on No-man's Heath* about seven miles from Tamworth, on the Measham

---

* A small Common on a rich soil, which the folly of contending parties has doomed to perpetual neglect and trespass, and where *four* County crosses are still absurdly maintained, although since the Inclosure of the surrounding parishes, the nearest approach of Staffordshire is one mile distant from this common, on the Clifton Road.



Neele, sculp. Strand.

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Road, its most northern at the Ethrow Brook in Longdendale, near the road from Mottram to Penistone, between Woodhead and Saltersbrook House: its most eastern extremity is at the junction of the Brooks, one furlong south of Holm-car Farm in Shire Oaks, near Worksop, and its most western extremity is at the junction of the Goyte and Ethrow Rivers, called the Water-meetings, a quarter of a mile east of the famous Aqueduct Bridge, north of Marple, in Cheshire.

The greatest length of Derbyshire being, in a direction from S S E to N N W, from No-man's Heath to Longdendale, and measuring about 56½ miles, the line of which crosses however a small angle of Leicestershire in Nether Seal, and another of Staffordshire, between the Trent and Dove Rivers, N E of Burton: its greatest breadth is about from E N E to W S W, from Holm-car Farm above mentioned, to Paniers-pool Bridge, at the meeting of Dane's Brook and Blackclough Brook, half a mile south of the road from Congleton to Buxton, being 33 miles of direct distance.

Derbyshire approaches to no regular figure in shape; it is bounded on its north-east end by the West Riding of Yorkshire, from the Sheep-wash at the meeting of Little-clough and Ethrow waters, about half a mile south-west of Saltersbrook House, above mentioned, to New Shire-Oak Tree, about half a mile north-west of Steetly ruined Church; from whence on the north for a small distance to Holm-car and thence on the East to the junction of Lockington Brook and the Soar River, south-east of Sawley-cliff Farm (which is in Derbyshire, tho' south of the present channel of the Trent River) it is bounded by Nottinghamshire. From the point last described, which is opposite to Red-Hill Gypsum quarries, the south-east end of Derbyshire is bounded by

Leicestershire, to a point in the Brook about three-quarters of a mile south-east of Lullington Church; and from another point in the Mease River, about three-quarters of a mile west of Chilcote Church, and thence round the large detached part of Derbyshire, to No-man's Heath in Chilcote, above mentioned. Of the irregularity and confusion which reigns in the south-western part of this Derbyshire boundary, against Leicestershire, as also against Staffordshire, I shall have occasion to say more in the next division. From No-man's Heath for about a mile, to a point north-west of Honey-Hill in the Thorpe-Constantine Road, Warwickshire joins on the south-west corner of Derbyshire. From which last point, to the Mease River west of Chilcote Church as above, Staffordshire adjoins; as it does also, from the point south-east of Lullington Church before mentioned, on the south-west and west sides of the County, to Paniers-pool Bridge near Flash, before mentioned: and, from Paniers-pool Bridge to the Sheep-wash near Saltersbrook House, before mentioned, Cheshire adjoins the County on the west and north-west sides.

And thus it happens, that there are on the borders of Derbyshire eight places where *three* Counties meet in one point, viz. Saltersbrook Sheep-wash, New Shire-Oak, in the Soar River at the south-east corner of Sawley-cliff Farm, on No-man's Heath, on the S W of Honey-Hill, at the junction of Chilcote Brook with the Mease W of Chilcote Church, in the Brook S E of Lullington Church, and at Paniers-pool Bridge; two of these being occasioned, by Leicestershire containing a large detached part of Derbyshire within its bounds, except where the same adjoins Warwickshire.

The Surface of Derbyshire is much diversified, yet far less enormously so, than many writers have represented it: full one half of the County, taken at its southern end and nearly along its eastern side, might rather be represented as a flat country than otherwise, yet having on the whole an easy ascent towards the north-west end of the County, whose elevation is certainly considerable, the surface advancing gradually in height, to the *Grand Ridge* or waterheads of our Island, which enters the County from Staffordshire on the middle Axe-edge Hill, about a quarter of a mile north-west of Dove-head on the Leek and Buxton Road, and pursues a N N E and serpentine course across the County (as shewn in the Map of Ridges facing page 1) to "the Trough," at the head of the main or east branch of the Derwent River*, and the head of Little-clough water (before mentioned, p. 2), where the Grand Ridge enters Yorkshire, after having separated or cut off the very large parish of Glossop, Chapel-en-le-Frith, and parts of Hartington and Hope parishes, as belonging to the western drainage of the Island. In the original or quarto Report of 1794 on this County, Mr. Thomas Brown gave a sketch Map, shewing all the principal *Rivers* of the County of Derby, and as the same are also to be readily traced on any of the numerous Maps which are extant, I have preferred giving in this place, a sketch Map, to the same scale, shewing all the RIDGES or *Waterheads* of the County and its vicinity; by reference to which, the course of the Grand Ridge above mentioned, and of all the inferior Ridges or branches therefrom, with the situations of the principal Eminences situated thereon and of the Hills, will the more readily be perceived, from the description which follows. On the *Grand Ridge* (coloured Vermillion) the three principal eminences of the County, Axe-edge, Kinder-scout, and Blakelow-stones are situated, the latter appearing to me, to be considerably the highest of the three, and Axe-edge the lowest, which seems equalled in height, if not exceeded, by Goyteshead Tor, on the N of Stoney-lane Toll Bar on the Macclesfield and Buxton Road, which hill is situate on a branch from the Grand Ridge near Axe-edge into Cheshire, which will be mentioned hereafter. From the western side of the Grand Ridge in Glossop and Chapel-en-le-Frith, there spring four or five ridges of considerable height; but they are too short to require further notice for the present.

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* Erroneously called the Wrongsley River in some Maps.

On the eastern side of the Grand Ridge, the longest and most remarkable collateral Ridge, falling wholly within the County, is that which limits the drainage of the Derwent River on its western side, from great Axe-edge Hill to the junction of the Derwent and Trent Rivers at Wilden Ferry in Sawley, decreasing pretty uniformly in height (exclusive of particular eminences thereon) through a direct distance of about 35¼ miles, but which length it exceeds, by 10 miles or more, when its various windings are followed: this Ridge for the sake of distinction I denominate the *West-Derwent Ridge* (coloured Green), and which will be found to limit the drainage of the Dove River also, on its eastern side, from Axe-edge southward to Snaper Farm, situate about a mile S E of Brailsford Town, whence a branch-ridge proceeds southward, to near the junction of the Dove and Trent Rivers at Newton-Solney Ford, which branch may be called the *East-Dove Ridge*. The Eastern limits of the Derwent's drainage, will be found to constitute a very long Ridge, which I call the

Huddersfield Colne Rivers. The Grand Ridge, proceeding further north-westward, along the boundary between Cheshire and Yorkshire, crosses the road from Mottram to Huddersfield on Holm-moss; about a mile to the north-west of which, the Grand Ridge enters Yorkshire, in its majestic progress towards Scotland, and at the same point throws off a ridge to the westward, still along the county bounds, to Wallstone-edge, and thence through Cheshire, by Harrop-edge and Werneth-Low Hills, to the Water-meetings Aqueduct before mentioned: and this range, as forming the northern limits of the Ethrow drainage may be called the *North-Ethrow Ridge*. In like manner, there springs from the Grand Ridge near the north or great Axe-edge, the *West Goyte Ridge*, which proceeding by Stake-top, Goytes-head Tor (before mentioned), Lyme-Park, Disley and Marple, terminates at the Water-meetings Aqueduct, above mentioned (page 2).

From middle Axe-edge Hill, the *Grand Ridge* (coloured Vermillion) proceeds into Staffordshire, across the southern Axe-edge and to Brown-middle Hill, where a branch is thrown off to the South (which will be mentioned presently), from thence by the Royal Cottage Inn, the High Roches and Gun-Moor Hills and by Rye-croft Gate, to Biddulph-Moor Hill, and thence past Knipersley Hall, for Golden Hill, &c. having the heads of the Dane River originating from it on the north, in the whole of this distance. From Biddulph-Moor Hill a principal ridge branches, and proceeds by Bagnall, Cellar-head Inn, Dilhorn, Leigh, Loxley-Green, Seven-Hands or new Road-meetings on Needwood Forest, Anslow and Stretton to Newton-Solney Ford before mentioned, by which the drainage of the Dove and its tributary streams the Churnet, Hamps, Manifold, &c.

are entirely circumscribed on the West, which may be called the *West Churnet and Dove* Ridge. From Brown-middle Hill mentioned above, a long branch Ridge goes off by Black-meer Hill and Moor-edge long range of Hills (Moredge), Ipstones-edge, Caldon Low, and Weaver Hill to Rocester Town, which as bounding the drainage of the Churnet on its eastern side, is called the *East Churnet Ridge*, (coloured Yellow). From the southern Axe-edge Hill near Flash, a branch Ridge proceeds by Hollin-Clough, Sheen Hill, Wetton and Bunster Hill to Thorpe-Mill near Ilam, which I denominate the *East Manifold Ridge*.

I will now return to the Derbyshire part of the Grand Ridge, and mention a principal branch therefrom, which forms the eastern limits of the drainage of the Wye River: this *East-Wye Ridge* (coloured Yellow) commences on Rushop-edge, proceeds over Lords-Seat Hill by Oxlow-House, on the road from Castleton to Chapel-en-le-Frith, over Copt-round and Tideslow Hills, through Foolow, over Blakelow-Tor, by Rowdale and Cawton-Hill to Great Rowsley, where the Wye and Derwent Rivers unite.

From Great Low on the West-Derwent Ridge, before described (p.5), the *South-Wye Ridge* springs, and proceeding near to Chelmerton, Sheldon aad Over-Haddon villages, terminates in the angle between the Wye and Lathkil Rivers, near Great Rowsley. I shall mention here but one other Ridge in this part of the County, conceiving, that the Map annexed, and the Alphabetical List of the principal Hills and Eminences referring each to their proper Ridges, which follows, will render this subject familiar to any one who may take the trouble of examining them. At Minning-Low Hill, a branch is thrown off from the West-Derwent

Ridge, which passing near to Pike-Hall, Elton and Birchover, and across Stanton Moor to Great Rowsley, limits the drainages of the small Rivers Bradford and Lathkil, which are in fact but branches of the Wye, having no separate discharge into the Derwent, the last may be called the *East Bradford and Lathkil Ridge.*

The *Grand Ridge**, from near Golden-Hill, above mentioned, continues to advance south-westwardly and then south, near to the western bounds of Staffordshire, touches on Shropshire and Gloucestershire, and turning eastward through Warwickshire, it arrives again within about eleven miles of the southern extremity of Derbyshire, having in this large circuit to the westward, circumscribed the entire drainage of the Trent River, and its tributary streams the Sow, the Penk, the Tame, the Anchor, &c.: when arrived near the old Roman Road at Cloudsley Bush, SW of High-cross on the Watling Street, it throws off a principal Ridge to the north, from which originates all the Ridges and Hills in Derbyshire south of Trent, and in Charnwood Forest and the parts of Leicestershire and Warwickshire adjoining Derbyshire: this Ridge, which I call the *West-Soar Ridge* (coloured Vermillion) enters the Map near Stapleton, and proceeds near Bagworth, across Green-Hills and Bardon-Hill on the south-western confines of Charnwood Forest, Swannington, near Isley-Walton and Castle-Donnington, to Sawley-cliff Farm in Derbyshire, near the junction of the Trent and Soar Rivers, before mentioned (page 2).

From the West-Soar Ridge near Swannington, a branch proceeds north-westward by Cole-Orton, and enters Derbyshire at Old-Park west Farm, and thence proceeds on to Pistern common, and to Butt-House on the road from Ashby-de-la-Zouch to Burton, and thence by Wooden-Box Toll-Bar, Church-Gresley, Coton-Park, and Burrow-Fields, to the junction of the Mease and Trent Rivers near Croxall, which Ridge (except about one mile at its east end) is denominated the *North Mease Ridge*, and is coloured Yellow. The want of Names to the several small Derbyshire Rivulets on the south of Trent, whence names might have been derived for the Ridges, has determined me to denominate a very conspicuous Ridge which proceeds from near Ashby-de-la-Zouch Town to Scropley-Hill facing Burton, nearly along the Turnpike Road between these places, the *Ashby and Burton Ridge;* it is coloured blue. The *South Mease Ridge* springs from the west end of the north Mease Ridge, S of Cole Orton, and proceeds near to Normanton on the Heath, Preston-pans, and across No-man's Heath before mentioned (p. 1), and thence by Thorpe-Constantine and Harlaxton, to the junction of the Mease and Trent Rivers above mentioned. This last Ridge is coloured Green on the Map.

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* The course of this main Ridge of the Island, from Dover and from the Land's-End, meeting in Wiltshire, and proceeding across England into Scotland, with the strata which it traverses, are described in the article GRAND RIDGE, in Dr. Rees's new Cyclopædia, lately published.

Names, situations and lengths of the several principal Ridges *or Waterheads, in and near Derbyshire, in alphabetical order, with the colour by which each is distinguished in the Map facing page* 1.

South *Amber* Ridge (Green) from No. 60, on East Derwent Ridge, nearly W 5 *m.*—the Hills on or near it are numbered 1 to 4.

West *Amber* Ridge (Lake) from No. 36, on East Derwent Ridge, S S E about 11 *m*. Hills No. 1 to 21.

Ashby and Burton Ridge in Leicestershire and Derbyshire (Blue) crossing, or rather branching from the North Mease Ridge at Nos. 13 and 16; W N W and E S E 8 *m*. Hills No. 1 to 12.

East *Ashop* (Orange) from No. 9 on the Grand Ridge, nearly S E 9 *m*. Hills No. 1 to 3.

West *Bootle* (Vermillion) from No. 1, on South Amber Ridge, S S W about 7 *m*. Hills No. 1 to 4.

East *Bradford and Lathkil* (Orange) from No. 61, on the West Derwent Ridge, N E about 6 *m*. Hills No. 1 to 16.

Charnwood Ridge in Leicestershire (Green) from Mount-Sorrel to Thringstone, touching the West Soar Ridge at Copt-Oak Wood; nearly E and W, bowing greatly to the S, about 14 *m*. Hills No. 1 to 60.

West *Churnet and Dove* in Staffordshire (Blue) from No. 18 on the Grand Ridge, S E 38 *m*. Hills No. 1 to 30.

East *Churnet* in Staffordshire (Yellow) from No. 33 on the Grand Ridge, S S E 18 *m*. Hills No. 1 to 22.

North *Dane* in Cheshire (Blue) from near No. 3 on West Goyte Ridge, extends beyond the limits of the Map, Hills No. 1 to 10.

East *Derwent* in Yorkshire, Derbyshire and Nottinghamshire (Blue) from No. 6 on Grand Ridge, nearly S E a crooked course of about 67 *m*. Hills No. 1 to 74.

West *Derwent* (Green) from No. 31 on the Grand Ridge, nearly S E a winding course of about 46 *m*. Hills No. 1 to 103.

[illegible] *Doles* (G[illegible] [illegible]om No. 50 on the East Derwent [illegible] Hills No. 1 to 9.

North *Don* in Yorkshire (Green) from No. 3 on the Grand Ridge eastwardly beyond the limits of the Map.

East *Dove* (Lake) from No. 74 on the West Derwent Ridge, nearly S about 10 *m.* Hills No. 1 to 3.

East *Ecclesburn* (Yellow) from No. 76 on the West Derwent Ridge, SSE about 11 *m.* Hills No. 1 to 19.

East *Erewash* in Nottinghamshire (Yellow) from No. 1 on South Idle Ridge, S 15 *m.* Hills No. 1 to 17.

North *Ethrow* in Yorkshire and Cheshire (Green) from No. 1 on the Grand Ridge, SW about 11 *m.* Hills No. 1 to 12.

West *Goyte* in Cheshire (Yellow) from No. 28 on Grand Ridge, NNW about 15 *m.* Hills No. 1 to 11.

Grand Ridge in Yorkshire, Derbyshire and Staffordshire (Vermillion) about from NNE to SSW, by a crooked course of nearly 66 *m.* within the limits of the Map,—Hills on or near to it No. 1 to 41. See page 4.

South *Idle* in Nottinghamshire (Vermillion) from No 54 on East Derwent Ridge eastwardly beyond the limits of the Map, Hills No. 1 to 5.

North *Idle* in Yorkshire and Nottinghamshire (Blue) from No. 31 on East Rother Ridge, NE beyond the Limits of the Map, Hills No. 1 and 2.

East *Leen* in Nottinghamshire (Green) from No. 5 on South Idle Ridge, S about 11 *m.* Hills No. 1 to 6.

West *Manifold* in Staffordshire (Green) from No. 1 on West Churnet Ridge, SE 7 *m.* Hills No. 1 to 6.

East *Manifold* in Staffordshire (Green) from near No. 32 on the Grand Ridge, SSE about 15 *m.* Hills No. 1 to 20.

North *Mease* in Leicestershire and Derbyshire (Yellow)

low) from the South Mease Ridge near Cole Orton (a branch from the West Soar Ridge) W, a crooked course of about 17 *m.* Hills No. 1 to 30.

South *Mease* in Leicestershire between Derbyshire and Warwickshire, and in Staffordshire (Green) from near Cole Orton (a branch from the West Soar Ridge) W, a bowing course of about 20 *m.* Hills No. 1 to 13.

East *Morledge* (Orange) from No. 83 on West Derwent Ridge, S E about 8 *m.* Hills No. 1 to 8.

North *Noe* (Green) from No. 17 on the Grand Ridge, E S E 8 *m.* Hills No. 1 to 4.

South *Noe* (Lake) from the East Wye Ridge near No. 24, N E 3½ *m.* Hills No. 1 to 8.

East *Nut-Brook* (Lake) from No. 63 on East Derwent Ridge, S E about 6 *m.* Hills No. 1 to 4.

East *Rother* in Nottinghamshire, Derbyshire, and Yorkshire (Yellow) from No. 52 on East Derwent Ridge, N about 26 *m.* Hills No. 1 to 32.

West *Rother* in Derbyshire and Yorkshire (Lake) from No. 27 on East Derwent Ridge, N E about 14 *m.* Hills No. 1 to 22.

North *Schoo* (Lake) from No. 74 on West Derwent Ridge, SW about 8 *m.* Hills No. 1 to 5.

South *Schoo* (Yellow) from No. 81 on West Derwent Ridge, about W S W 8 *m.* (with four southern branches between Rivers without names), Hills No. 1 to 15.

North *Shelf* (Yellow) from near No. 11 on the Grand Ridge, W about 4 *m.* Hills No. 1 and 2.

South *Shelf* (Blue) from near No. 14 on the Grand Ridge, nearly W about 5 *m.* Hills No. 1 to 7.

East *Soar and Eye* in Leicestershire, Rutlandshire, and Nottinghamshire (Blue) from the Grand Ridge near Walton to Red Hill, at the junction of the Soar and Trent, Hills No. 1 to 3.

West *Soar* in Warwickshire and Leicestershire (Vermillion) from the Grand Ridge near High-Cross, nearly N about 33 *m*. Hills on it and its collateral Ridge No. 1 to 19.

East *Wye* (Yellow) from No. 21 on the Grand Ridge, about S E 17 *m*. Hills No. 1 to 37.

South *Wye* (Lake) from No. 21 on West Derwent Ridge E, a crooked course of near 12 *m*. Hills No. 1 to 23.

The forty-one Ridges or ranges of high land in or near to Derbyshire particularised in the above list, with the colours by which they are severally distinguished in the Map facing page 1, will it is hoped render the necessary references easy, for even a stranger to the County to obtain a clear idea of the situation of its principal Hills and Valleys; and what is done herein will supersede the necessity of much which ought otherwise to have been introduced in Section VI. of this Chapter under the article *Rivers;* all the considerable streams of the district being marked in the Map referred to, and the space or surface whence their waters are collected, clearly shewn. The large Mineralogical Map of the County and borders, which I have prepared for future publication, whence this reduced Map was made, has enabled me to particularise almost 700 Hills and Eminences on these Ridges or their collateral and subordinate branches, and (with a few exceptions, in parts where my Mineral Survey is not quite completed) I have mentioned the particular Rock or stratum which crowns or occupies the top of each eminence, in the following alphabetical List, by which reference can easily be made to the Map facing page 1, for their localities, and to the Sections and accounts of the several Strata given in Section IV. of this Chapter for explaining the Map of Soils, in order to see, generally, the structure or stratification of each of these numerous Hills or high and remarkable spots.

An Alphabetical List of the Names of the several Mountains, HILLS and Eminences throughout Derbyshire, or in the borders of the adjoining Counties, describing their situations, the STRATA on the top of each, and referring by numbers to the RIDGES to which they severally belong, in the Map facing page 1.

Abraham Chair, between Yorkshire and Cheshire, near Mossley, 1st Grit-stone Rock, No. 5, N of North Ethrow Ridge.

Alders Cliff, near Church-Sterndale in Hartington, 4th Lime-stone Rock, No. 16, W of West Derwent Ridge.

Alderwasley Windmill-hill in Wirksworth, 2nd Grit, No. 8, W of East Ecclesburn Ridge.

Aldwark Hill, near Brassington, a Hummock, or isolated patch of the 3rd Limestone, E of West Derwent Ridge.

Alise Head, in Ashover, 2nd Grit, on East Derwent Ridge.

Alkmanton Village, in Longford, Red Marl, No. 7, S of South Schoo Ridge.

Allestry Town, Red Marl, No. 7, on East Morledge Ridge.

Alpert-Castles Hill, near Rowlee, in Hope Woodlands, shale Grit, large slips, No. 1, on East Ashop Ridge.

Alport Hill, in Spout near Wirksworth, 1st Grit, very high, a Station (Orpit) in the Government Trigonometrical Survey, No. 9, on East Ecclesburn Ridge.

Alport Low, a Hummock of the 1st Grit, in Hope Woodlands, No. 12, on the Grand Ridge.

Alt Hucknal Village, yellow Lime, No. 3, on the East Rother Ridge.

Alton Grange, near Ravenstone, Leicestershire, Grit, No. 1, on South Mease Ridge.

Alton Hill in Shottle, Shale and shale Grit, No. 13, on East Ecclesburn Ridge.

Anders Edge, near Jenkin chapel, Cheshire, Shale and shale Grit, No. 3, on West Goyte Ridge.

Annesley Hill, E of the Town, in Nottinghamshire, quartz Gravel, No. 2, on East Erewash Ridge.

Arbor Low, 1¼ *m.* N of Newhaven, in Middleton by Yolgrave, chert Gravel on 2nd Lime, very high, a Druidical circle of large stones on it, No. 52, E of West Derwent Ridge.

Ash, near Sutton on the Hill, Red Marl, No. 3, on East Dove Ridge.

Ashburne Windmill-hill, N of the Town, Shale, No. 5, on North Schoo Ridge.

Ashby Hill, at the W end of Ashby-de-la-Zouch Town, Leicestershire, Gravel on Red Clay, No. 1, on Ashby and Burton Ridge.

Ashover-quarry (of Grind-stones) near Flash Hall, in Ashover, 2nd Grit, very ancient quarries, No. 1, on West Amber Ridge.

Askew Hill, E of Repton, Red Marl, No. 12, N of North Mease Ridge.

Axe-edge Hill (great, or North) near Buxton, Shale and shale Grit, a very high hill, said to rise 625 yards above the sea, No. 29, on Grand Ridge.

Axe-edge Hill (middle), between Derbyshire and Staffordshire, 1st Grit, No. 31, on Grand Ridge.

Axe-edge Hill (South) near Flash in Staffordshire, 1st Grit, No. 32, on Grand Ridge.

Back Tor, near Castleton. See *Lose-hill.*

Bagot Park, near Abbots Bromley, Staffordshire, Red Marl, No. 18, on West Churnet and Dove Ridge.

Baldwins-castle Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, No. 19, N of Charnwood Ridge.

Ballington Hill, in Ambaston, Red Marl and Gypsum, issolated, No. 103, E of West Derwent Ridge.

Bamford Edge, near Bamford, 1st Grit, No. 14, W of East Derwent Ridge.

Bank-pasture Tor, S of Winster, 1st Lime Hummock, No. 4, E of East Bradford and Lathkil Ridge.

Bank Top, N of Dilhorn, Staffordshire, 1st Grit, and Shale? with Marl and Limestone beds, No. 14, on West Churnet and Dove Ridge.

Bank Top, SW of Hartington, in Staffordshire, Shale and shale Grit, No. 6, on East Manifold Ridge.

Bardon Hill, near Markfield, in Leicestershire, coarse Slate and Sienite, issolated and very high, a station in the Government Trigonometrical Survey, No. 7, on West Soar Ridge.

Barehill Edge, on Wirksworth Moor, 1st Grit, very high, No. 5, on East Ecclesburn Ridge.

Barlborough Town, yellow Lime, No. 10, on East Rother Ridge.

Barlstone Windmill-hill, S E of the Town, in Leicestershire, Red Marl, No. 1, on West Soar Ridge.

Barmoor Hill, in Peak Forest, 4th Lime, No. 22, on Grand Ridge.

Barn Hill, near Hopton in Wirksworth, 3rd Lime, No. 76, or West Derwent Ridge.

Barrow Hill, in Osgathorp, Leicestershire, yellow Lime, No. 12, E of West Soar Ridge.

Barrow Stones, in Hope Woodlands, 1st Grit, No. 7, E of Grand Ridge.

Bassil Wood, near Swithland, Leicestershire, Sienite, with pyritic veins? No. 30, N of Charnwood Ridge.

Bathem-edge on Tideswell Moor, E of Peak Forest Town, 3rd Lime, No. 22, on East Wye Ridge.

Beacon Hill, S of Rolleston, Staffordshire, Red Marl, No. 30, on West Churnet and Dove Ridge.

Beacon Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, perhaps the highest hill in Charnwood Forest, No. 31, N of Charnwood Ridge.

Beacon Hill, near Wooton, Staffordshire, 4th Lime, high, No. 20, W of East Churnet Ridge.

Beacon Rod (or Beaten) N of Hassop, near Stoney Middleton, 1st Lime, No. 31, E of East Wye Ridge.

Beddow Wood, near Quorndon, Leicestershire, issolated, large and high, Sienite, No. 6, N of Charnwood Ridge.

Bee Low, near Oak-Moor Mill, Staffordshire, a 2nd Grit Hummock, No. 15, W of East Churnet Ridge.

Beeston Windmill-hill, N of the Town, Notts, quartz Gravel. on Red Marl, No. 16, E of East Erewash Ridge?

Belmont Hill, near Ipstone, Staffordshire, 2nd Grit, No. 10, W of East Churnet Ridge.

Belper Windmill-hill, W of the Town, 2nd Grit, No. 3, S of South Amber Ridge.

Belton Town, in Leicestershire, Red Marl, No. 9, E of West Soar Ridge.

Bens Cliff, near Woodhouse-eaves, Leicestershire, coarse Slate, one of the highest peaks in Charnwood Forest, No. 20, N of Charnwood Ridge.

Benty-Grange Hill, near Pilsbury in Hartington, 2nd Lime, No. 32, on West Derwent Ridge.

Berley Common, near Hackenthorp, 11th Grit, No. 16, E of West Rother Ridge.

Berry Cliff, NW of Elton, 1st Grit? No. 11, W of East Bradford and Lathkil Ridge.

Biddulph Moor, N W of Leek, in Staffordshire, Shale and shale Grit, No. 38, on Grand Ridge.

Birchwood Hill, near Shaw Lane, Leicestershire, coarse Slate, No. 47, on Charnwood Ridge.

Birchwood Moor, in Roston, sandy Gravel, on Coal-measures? No. 12, S of South Schoo Ridge.

Birchwood Park, in Roston, an issolated yellow Lime Rock? No. 11, S of South Schoo Ridge.

Bird (or Windmill) Hill, W of Woodhouse-eaves, Leicestershire, coarse Slate, very high, No. 32, N of Charnwood Ridge.

Birkin Lane, in Ashover, 3rd Coal shale, good Fire-Clay, No. 47, on East Derwent Ridge.

Birstal Cliff-house, N of Leicester, alluvial Clay, Flints, &c. on Red Marl, No. 3, E of West Soar Ridge.

Black-bird's-nest Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, No. 33, N of Charnwood Ridge.

Black-meer Hill, near Upper Elkstone, Staffordshire, Shale, slipt at the Meer, No. 1, on East Churnet Ridge.

Blackwall Hill, near Kirk Ireton, a Hummock of quartz Gravel, on Shale, No. 79, on West Derwent Ridge.

Bladon Hill, in Newton Solney, Gravel on Red Marl, No. 9, N of Ashby and Burton Ridge.

Blakelow, ¼ *m.* E S E of Bradwell, Shale and shale Grit, No. 6, on South Noe Ridge.

Blakelow, near Bright-Gate, in Winster, 2nd Lime, very high, No. 5, E of East Bradford and Lathkil Ridge.

Blakelow, S S W of Elton, 1st Lime, No. 1, on East Bradford and Lathkil Ridge.

Blakelow, E of Little Rowsley, in Darley, 2nd Grit, high, No. 38, W of East Derwent Ridge.

Blakelow, near Macclesfield, Cheshire, 4th Grit, No. 4, N of North Dane Ridge.

Blakelow Stones, S E of Woodhead, between Hope and Glossop liberties, 1st Grit, the greatest elevation in Derbyshire, or near it, perhaps, No. 9, on Grand Ridge.

Blakelow Tor, N E of Great Longsdon, very high, 1st Lime, No. 30, on East Wye Ridge.

Blindow Top, S of Chelmerton, 3rd Lime, No. 1, on South Wye Ridge.

Bole Hill, in Barlow, 8th Grit, No. 32, E of East Derwent Ridge.

Bole Hill, S of Calow, in Chesterfield, 9th Grit, No. 5, on West Dolee Ridge.

Bole Hill, N W of Norton, 6th Grit, No. 6, W of West Rother Ridge.

Bole Hill, S of Sheldon, in Bakewell, 1st Lime, an old Lead Hearth, No. 18, on South Wye Ridge.

Bole Hill, N E of Treton, Yorkshire, salmon-coloured Grit, No. 26, W of East Rother Ridge.

Bole Hill, in Wingerworth, 4th Grit, quarries, and old Lead Hearth, clothed with Fir Woods, No. 48, on East Derwent Ridge.

Bole-end Hill, at Hargate Wall, in Wormhill, a Hummock of 2nd Lime, No. 24, E of Grand Ridge.

Bolsover Moor, near Whaley, yellow Lime, quarries, No. 7, E of East Rother Ridge.

Bolsover Town, yellow Lime, No. 6, on East Rother Ridge.

Bond-wood Hill, N of Hartshorn, Gravel, No. 11, N of North Mease Ridge.

Boston Castle, near Rotherham, Yorkshire, salmon-coloured Grit, No. 32, on East Rother Ridge.

Bow-cross, N E of Bakewell, Shale and shale Grit (Bakewell Edge Freestone quarries), No. 35, on East Wye Ridge.

Bowstone Cross, in Lyme Park, Cheshire, 1st Grit, No. 7, on West Goyte Ridge.

Boylstone Hill, near the Town, Red Marl, No. 8, S of South Schoo Ridge.

Boythorp Hill, S W of Chesterfield, 10th Grit, No. 43, E of East Derwent Ridge.

Bradfield Moor, near Bolterstone Chapel, in Yorkshire, 1st Grit, No. 7, E of East Derwent Ridge.

Bradgate Park, S E Hill, near Cropstone, Leicestershire, coarse Slate, No. 25, N of Charnwood Ridge.

Bradgate Park, W Hill, near Newton Linford, Leicestershire, part Sienite and part coarse Slate, No. 23, N of Charnwood Ridge.

Bradley-Park Clump, in Bradley, Gravel quartz, on Shale, No. 2, on South Schoo Ridge.

Bradway Cross, E of Totley, 6th Grit, No. 5, on West Rother Ridge.

Brailsford Hill, N of the Town, Gravel, on Red Marl, No. 86, on West Derwent Ridge.

Bramcote Hill, near Stapleford, Notts, quartz Gravel, on Coal-Shale, No. 14, W of East Erewash Ridge.

Bramcote Town, Notts, quartz Gravel on Red Marl, No. 15, on East Erewash Ridge.

Bramley Moor (warren-house), W of Eckington, 9th Grit, No. 9, E of West Rother Ridge.

Brand Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, the Switland-Slate quarries, No. 29, N of Charnwood Ridge.

Breach Hill, in Denby, Grit, No. 62, on East Derwent Ridge.

Bredsall Moor, N of Bredsall, salmon-coloured Grit, No. 66, W of East Derwent Ridge.

Breedon Church Hill, N of the Town, Leicestershire, yellow Lime, No. 4, N of the North Mease Ridge.

Bretby Clump, N of the Church, Red Marl, No. 7, N of Ashby and Burton Ridge.

Bretland Edge, near Woodhead, between Yorkshire and Cheshire, Peat on 2nd Grit, No. 2, on Grand Ridge.

Brierley Hill, near Brierley-foot Bar, in Hartington, 4th Lime, No. 14, on West Derwent Ridge.

Brimmington Town, 8th Grit, No. 7, W of West Dolee Ridge.

Brinsley Windmill-hill, SW of the Village, Notts, Grit, No. 6, W of East Erewash Ridge.

Brislincote Hill, near Stapenhill, Red Marl, No. 60, S of Ashby and Burton Ridge.

Broad Hill, near Whitwick, Leicestershire, coarse Slate, No. 57, on Charnwood Ridge.

Broadhurst Hill, near Sheepshead, Leicestershire, coarse Slate, No. 46, N of Charnwood Ridge.

Broombridge Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, No. 28, N of Charnwood Ridge.

Broomhead Moor, 2¼ m. N W of Bolterstone Chapel, in Yorkshire, Peat on 1st Grit, No. 6, E of East Derwent Ridge.

Brown-edge, near Endon, Staffordshire, coarse Grit Rocks of the Upper Coal Series, No. 1, on West Churnet and Dove Ridge.

Brown Middle Hill, near Flash, in Staffordshire, high, Shale and shale Grit, No. 83, on Grand Ridge.

Buckton Castle Hill, Cheshire, near Mossley, 1st Grit, No. 6, N of North Ethrow Ridge.

Bullhurst, near Muggington, quartz Gravel, on Shale, No. 3, on East Morledge Ridge.

Bullock-Round, near Hartington, 4th Lime, No. 38, W of West Derwent Ridge.

Bunker's Hill, in Chatsworth Old-Park, 3rd Grit, No. 35, W of East Derwent Ridge.

Bunster Hill, near Ilam, Staffordshire, No. 20, on East Manifold Ridge, 4th Lime, Slither.

Burley Hill, S of Duffield, quartz Gravel, on Shale, No. 5, on East Morledge Ridge.

Burnaston Hill, in Etwall, Red Marl, No. 92, W of West Derwent Ridge.

Burrow Fields, near Walton on Trent, Red Marl, No. 28, on North Mease Ridge.

Burrow Hill, near Walton on Trent, Red Marl, No. 29, N of North Mease Ridge.

Bur Tor (or Hucklow-edge), N of Great Hucklow Village, Shale and shale Grit, a Great Slip, No. 1, on South Noe Ridge.

Butt-house, near Blackfordby, between Derbyshire and Leicestershire, Red Clay, No. 13, on North Mease Ridge.

Cademan Hill, near Whitwick, Leicestershire, coarse Slate, No. 56, on Charnwood Ridge.

Cadhouse Lane, near Ticknall, high, No. 8, N of North Mease Ridge.

Cadley Hill, near Castle Gresley, quartz Gravel, No. 20, N of North Mease Ridge.

Caldon Low, S of the Town, Staffordshire, 4th Lime, large Quarries, S, No. 16, on East Churnet Ridge.

Callenge-low Hill, in Yolgrave, 1st Lime, No. 53, E of West Derwent Ridge.

Callengewood Hill, near Tatenhill, Staffordshire, high, loamy Gravel, on Red Marl, No. 27, on West Churnet and Dove Ridge.

Calver Peak, W of the Village near Stoney-Middleton, 1st Lime, large Quarries, No. 32, E of East Wye Ridge.

Cardel Low, near Ludwell in Hartington, 4th Lime, No. 30, W of West Derwent Ridge.

Castern-low, near Heathcote in Hartington, 4th Lime, with a clay wayboard and Well near its top, No. 36, W of West Derwent Ridge.

Castle Hill, in Castle-Donnington Town, Leicestershire, Red Marl, No. 19, on West Soar Ridge.

Castle Hill, at Castleton, 4th Lime, No. 6, E of East Wye Ridge.

Castle Hill, in Mount Sorrel Town, Leicestershire, Sienite, Quarries for Paving, No. 1, on Charnwood Ridge.

Castle Hill, in Nottingham, Gravel Rock, No. 6, E of East Leen Ridge.

Castle Hill, in Pentridge, 7th Grit, No. 59, W of East Derwent Ridge.

Castle-top, near Cromford, Shale and shale Grit, No. 9, W of West Amber Ridge.

Cawton Hill, E of Bakewell, Shale and shale Grit, No. 36, on East Wye Ridge.

Cawton Hill, near Blackwell and Chelmerton, alluvial Toadstone, on 3rd Lime, No. 5, N of South Wye Ridge.

Cellar Head, near Dilhorn, Staffordshire, Gravel on Marl and Limestone, No. 4, on West Churnet and Dove Ridge.

Chaddesden Moor, N E of Chaddesden, alluvial Clay, No. 67, on East Derwent Ridge.

Charley Knowl, in Charnwood Forest, Leicestershire, coarse Slate, No. 39, N of Charnwood Ridge.

Charriot Clump, in Griffe near Hopton, chert Gravel, on 3rd Toadstone, No. 75, E of West Derwent Ridge.

Cheadle Park, N of Cheadle, Staffordshire, quartz Gravel, No. 8, E of West Churnet and Dove Ridge.

Chee Tor Hill, near Blackwell and Wormhill, 4th Lime, tilted, No. 6, N of South Wye Ridge.

Chellaston Hill, S E of the Town, alluvial Clay on Gypsum and Red Marl, Gypsum Quarries, No. 100, on West Derwent Ridge.

Chelmerton Low, N of the Town, 2nd Lime, a very high point, No. 4, N of South Wye Ridge.

Chelmerton Thorn, S E of the Church on the Bakewell Road, 3rd Lime, No. 2, on South Wye Ridge.

Chinley-churn, near Chapel-en-le-Frith, 2nd Grit, No. 20, W of Grand Ridge.

Chevin Hill, SW of Belper, 1st Grit, high, No. 17, on East Ecclesburn Ridge.

Chevin N Hill, W of Belper Lane-end, 1st Grit, No. 11, E of East Ecclesburn Ridge.

Chilcote Hill, near Stretton-en-le-Fields, Red Marl, S of South Mease Ridge.

Christ Church, on Needwood Forest, Staffordshire, loamy Gravel, on Red Marl, No. 26, W of West Churnet and Dove Ridge.

Church Gresley Town, Coal Shale, No. 19, on North Mease Ridge.

Cinder Hills, near Thringstone, Leicestershire, coarse Slate, red, No. 58, on Charnwood Ridge.

Cliff Ash Hill, near Kirk Ireton, a Hummock of quartz Gravel, or Shale, No. 80, E of West Derwent Ridge.

Cliff Bank, near Macclesfield, Cheshire, 3rd Grit, No. 3, N of North Dane Ridge.

Cliff Hills, near Markfield, Leicestershire, Sienite, No. 6, E of West Soar Ridge.

Cliff Hill, near Pilsbury in Hartington, 4th Lime, No. 27, W of West Derwent Ridge.

Cliff House, N of Rocester, Staffordshire, quartz Gravel, on Red Marl, No. 22, on East Churnet Ridge.

Clifton-Campville, Church-Hill, Staffordshire, Red Marl, No. 8, S of South Mease Ridge.

Cloud End, E of Congleton, between Stafford and Chester Counties, Coarse Grit Rocks of the Upper Coal Series, No. 37, on Grand Ridge.

Clouds Hill, near Breedon, Leicestershire, yellow Lime, No. 13, W of West Soar Ridge.

Clouds Hill, NW of Sandiacre, Red Marl and Gravel, No. 71, E of East Derwent Ridge.

Coatsfield Low, near Pilsbury in Hartington, 3rd Lime, No. 31, on West Derwent Ridge.

Cobden-edge, near Mellor, in Glossop, 4th Grit, Quarries, high, No. 6, S of South Shelf Ridge.

Coburn Hill, near South Winfield Park, 4th Grit, Quarry, No. 19, E of West Amber Ridge.

Cockey Low, near Abney in Hope, Shale and shale Grit, No. 5, S of South Noe Ridge.

Cocksmoor Clump (or Robinhood Hills), in Kirkby, Notts, quartz Gravel, on yellow Lime, very high, perhaps the highest point in Nottinghamshire, No. 1, on South Idle Ridge.

Cocks Knowl, S of Disley, Cheshire, Shale and shale Grit, No. 8, on West Goyte Ridge.

Cock Top, in Tibshelf, Grit, No. 51, on East Derwent Ridge.

Codnor Park, near Ripley, 10th Grit, No. 61, E of East Derwent Ridge.

Cole Aston Village, near Dronfield, 9th Grit, No. 7, E of West Rother Ridge.

Cole Orton Hill, W of the Village, Leicestershire, Coal Shale, No. 1, on North Mease Ridge.

Coneygree Hill, near Spout in Wirksworth, 1st Grit, No. 10, on East Ecclesburn Ridge.

Coneygree Hill, in Willington, loamy Gravel on Red Marl, No. 92, W of West Derwent Ridge.

Combs Moss, a large Hummock of 1st Grit (with 1st Coal Shale on part of it), N of Buxton, No. 27, on Grand Ridge.

Combs Rocks, near Charlesworth, in Glossop, 3rd Grit, No. 3, on South Shelf Ridge.

Compton Common, near Williamsthorpe, in North Winfield, Grit, No. 1, on West Dolee Ridge.

Coppy Hill, near Donnington Park, Leicestershire, Red Marl, No. 14, on West Soar Ridge.

Coppy Nook, between Leicestershire and Derbyshire, near Stanton Harrold, Red Clay, No. 3, N of North Mease Ridge.

Copt-Holly Hill, near Kirk Ireton, Shale and shale Grit, No. 78, on West Derwent Ridge.

Copt Oak, near Shaw Lane, Leicestershire, coarse Slate, No. 16, on Charnwood Ridge (also on the West Soar Ridge).

Copt Round, E N E of Peak Forest Town, very high, 3rd Lime, No. 14, on East Wye Ridge.

Cotes Park, in Alfreton, Coal Shale, No. 56, on East Derwent Ridge.

Coton Park, in Lullington, Red Marl, No. 24, on North Mease Ridge.

Crackendale-head, N of Bakewell, 1st Lime, No. 34, on East Wye Ridge.

Crich Chase, S S W of the Town, 1st Grit, No. 21, on West Amber Ridge.

Crich Cliff (monument), N N W of the Town, 1st Lime, very high, No. 17, on West Amber Ridge.

Cronkstone Hill, near Hurdlow, in Hartington, 3rd Lime, No. 18, W of West Derwent Ridge.

Crook Hills, S of Derwent Chapel, two Hummocks of 1st Grit, on Shale, No. 3, on East Ashop Ridge.

Crookstone Hill and Knowl, near Rowlee, in Hope Woodlands, 1st Grit, No. 3, on North Noe Ridge.

Croom Hill, at Dowall in Hartington, 4th Lime, sharp and wedge-like (as No. 51), No. 12, W of West Derwent Ridge.

Cropo Top, near Sutton on the Hill, Red Marl, No. 2, on East Dove Ridge.

Cropstone Village, near Thurcaston, Leicestershire, Red Marl, No. 9, on Charnwood Ridge.

Cross-low Bank, in Alsop, 4th Lime, No. 47, W of West Derwent Ridge.

Cross o'th' Hands, near Turnditch, quartz Gravel, on Shale, No. 1, on East Morledge Ridge.

Crow-chine, near Bamford, between Derbyshire and Yorkshire, 1st Grit, No. 12, on East Derwent Ridge.

Crow Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, No. 21, N of Charnwood Ridge.

Crow Trees, near Oak-Moor Mill, Staffordshire, 2nd Grit, No. 13, W of East Churnet Ridge.

Croxall Hill, E of Church, Red Marl, No. 30, on North Mease Ridge.

Cuckney Hay, near Nether Langwith, Nottinghamshire, quartz Gravel, on yellow Lime, No. 5, E of East Rother Ridge.

Cut Gate, on the ancient Horse Road from Derwent-Chapel to Penistone, deep Peat, on 1st Grit, No. 2, on East Derwent Ridge.

Damcliff, S E of Peak Forest Town, 4th Lime, No. 16, W of East Wye Ridge.

Darley Hill, N of Derby, Red Marl, No. 8, on East Morledge Ridge.

Deadmans-grave Wood, near Nether Langwith, Notts, quartz Gravel, on yellow Lime, No. 8, E of East Rother Ridge.

Dean-edge, near Woodhead, between Yorkshire and Cheshire, Peat on 2nd Grit, No. 3, on Grand Ridge.

Dean-head Stones, near Woodhead, in Yorkshire, 1st Grit, No. 6, on Grand Ridge.

Deer-leap Hill, near Ashover, 4th Grit, No. 46, W of East Derwent Ridge.

Derby Hill, in Hulland Ward, quartz Gravel, on Shale, No. 84, on West Derwent Ridge.

Derby Hills, near Ticknall, No. 9, N of North Mease Ridge.

Derwent-edge, near Darwent Chapel, 1st Grit, very high, No. 13, W of East Derwent Ridge.

Desford Hill, S of the Town, in Leicestershire, Red Marl, No. 2, E of West Soar Ridge.

Dilhorn Hills, S E of the Town, Staffordshire, quartz

Gravel, No. 15 on West Churnet and Dov Ridge.

Dimins-dale Top, ¼ *m.* S S E of Taddington, 2nd Lime, No. 14, on South Wye Ridge.

Dimpas Hill, near Forest Chapel, Cheshire, Shale and shale Grit, No. 1, on North Dane Ridge.

Dirtlow Hill, on Bakewell Moor, W of the Town, Shale-Limestone, Rottenstone Pits, No. 20, N of South Wye Ridge.

Donisthorpe, near Measham, No. 15, S of North Mease Ridge.

Donnington Park, near Castle Donnington, Leicestershire, Red Marl, No. 15, W of West Soar Ridge.

Donnington Windmill-hill, S of Castle Donnington, Leicestershire, Red Marl, No. 16, on West Soar Ridge.

Dove-stones Moss, near Saddleworth, Yorkshire, No. 2, N of North Ethrow Ridge.

Dove-stone Tor, near Darwent Chapel, between Derbyshire and Yorkshire, 1st Grit, No. 10, on East Derwent Ridge.

Dow Low, near Church-Sterndale in Hartington, 4th Lime, No. 15, on West Derwent Ridge.

Duffield Bank, E of the Town, 1st Grit, No. 4, on West Bootle Ridge.

Dums Hill, W of Dale Abbey, quartz Gravel, No. 69, on East Derwent Ridge.

Dunrake Hill, N E of Middleton by Wirksworth, 1st Lime, No. 2, E of East Ecclesburn Ridge.

Dunshill, near Teversall, in Nottinghamshire, Coal Shale, No. 1, on East Rother Ridge.

Eastwood Town, Nottinghamshire, No. 8, W of East Erewash Ridge.

Eaves Knoll, near New Mills, in Glossop, a Hummock of 4th Grit, No. 7, S of South Shelf Ridge.

Eccles Hill, S W of Hope, Shale and shale Grit, No. 11, E of East Wye Ridge.

Ecton Hill, near Warslow, in Staffordshire, Shale-Limestone, high, Copper Mine, No. 16, on East Manifold Ridge.

Edale Head, between Hope and Glossop Liberties, 1st Grit, No. 18, on Grand Ridge.

Edge Top, S E of Longnor, Staffordshire, Shale and shale Grit, No. 4, on East Manifold Ridge.

Edingtree Hill, N of Bradwell, 3rd Lime, No. 10, E of East Wye Ridge.

Edlaston Town, loamy quartz Gravel, on Coal-measures? No. 6, on South Schoo Ridge.

Elden Great Hill, 1¼ *m*. N of Peak Forest Town, N of Elden Hole, 4th Lime, No. 8, W of East Wye Ridge.

Elden Little Hill, 1½ *m*. W of Castleton, N E of Elden Hole, 4th Lime, No. 7, W of East Wye Ridge.

Elder Tor, in Brassington Pastures, 4th Lime, No. 68, on West Derwent Ridge.

Elford Hill, SE of the Town, Staffordshire, Red Marl, No. 12, S of South Mease Ridge.

Elford Lowe, S of Elford, in Staffordshire, Red Marl, No. 11, S of South Mease Ridge.

Elk Low (or Hillock Low), near Newhaven in Hartington, very high, 4th Lime, No. 59, on West Derwent Ridge.

End Low, in Middleton, by Yolgrave, 1st Lime, No. 55, E of West Derwent Ridge.

Ernocroft Barrows, near Chisworth, in Glossop, 3rd Grit, No. 5, S of South Shelf Ridge.

Fabric Hill, in Ashover, 1st Grit, No. 45, W of East Derwent Ridge.

Far Low, SW of Belper, 1st Grit, No. 16, E of East Ecclesburn Ridge.

Fauld Hill, near Tutbury, Staffordshire, Red Marl and Gypsum Quarries, No. 24, E of West Churnet and Dove Ridge.

Ferney Hill, near Basford, Staffordshire, quartz Gravel, and Shale, No. 8, W of East Churnet Ridge.

Fin Copt, 1¼ m. NW of Ashford, 1st Lime (strata similar to Matlock High Tor, in Section, *Plate* V.), No. 33, W of East Wye Ridge.

Finney Hill, near Sheepshead, Leicestershire, coarse Slate, No. 44, N of Charnwood Ridge.

Five-dale Trees, in Charnwood Forest, Leicestershire, coarse Slate, No. 38, N of Charnwood Ridge.

Flat Hill, in Charnwood Forest, Leicestershire, coarse Slate, No. 53, N of Charnwood Ridge.

Flowry Hill, S of Turnditch Town, quartz Gravel, on Shale, No. 2, E of East Morledge Ridge.

Fox Hill, near West Leek, Nottinghamshire, Red Marl, No. 2, on East Soar and Eye Ridge.

Fox Low, near Buxton in Hartington, 4th Lime, No. 5, E of West Derwent Ridge.

Fritchley Hill, E of the Village, in Crich, 1st Grit, No. 20, E of West Amber Ridge.

Gallows Low, near Pike Hall in Bradburne, 4th Lime, No. 62, E of West Derwent Ridge.

Garendon Park, near Loughborough, Leicestershire, Red Marl, No. 46, N of Charnwood Ridge.

Gibbet Hill, near Blackbrook Reservoir on Charnwood Forest, Leicestershire, coarse Slate, No. 43, N of Charnwood Ridge.

Gib Hill, near Blackwall in Kirk Ireton, Shale, No. 81, on West Derwent Ridge.

Glapwell Summer-house, N N W of the Village, yellow Lime, No. 4, on East Rother Ridge.

Glasshouse Common, N E of Whittington, 9th Grit, No. 12, E of West Rother Ridge.

Glead Hill, near Whitfield in Glossop, 1st Grit, No. 14, on Grand Ridge.

Glossop Low, N E of the Town, 1st Grit, Grey Slate, No. 1, on North Shelf Ridge.

Goathouse Hill, near Loughborough, Leicestershire, coarse Slate, No. 37, N of Charnwood Ridge.

Golden Hill, S of Congleton, in Staffordshire, upper Coal measures, No. 40, on Grand Ridge.

Goodgrave Edge, between Yorkshire and Cheshire, near Woodhead, Peat on 2nd Grit, very high, No. 1, on North Ethrow Ridge.

Gorse Hill, near Thorpe-Constantine, Staffordshire, Red Marl, No. 9, on South Mease Ridge.

Gorsey Bank, near Baslow, 1st Grit, No. 29, on East Derwent Ridge.

Gotam Hill, near Pike Hall in Bradburne, 4th Lime, No. 60, on West Derwent Ridge.

Goyteshead Tor, near Stoney-way Gate, in Forest Chapel, Cheshire, 1st Grit, very high, No. 2, on West Goyte Ridge.

Grace-Dieu House, near Thringston, Leicestershire, Red Grit? on Limestone, No. 59, N of Charnwood Ridge.

Grace-Dieu Toll-Bar, near Belton, Leicestershire, Red Grit? No. 60, N of Charnwood Ridge.

Grange-hill Top, W of Barlow, 2nd Grit, No. 31, E of East Derwent Ridge.

Gratton Low, in Yolgrave, 1st Lime, No. 58, E of West Derwent Ridge.

Great-Edges, near Pike Hall E, in Brassington, 3rd Lime, No. 63, E of West Derwent Ridge.

Great Low, near Hurdlow in Hartington, 4th Lime, No. 20, on West Derwent Ridge.

Green Hill, near Markfield, in Leicestershire, coarse Slate, No. 5, on West Soar Ridge.

Greenwich, near Ripley, Coal Shale, No. 60, on East Derwent Ridge.

Gresley Hill, N E of the Church, Notts, yellow Lime, No. 7, W of East Erewash Ridge.

Grey (or Gree) Tor, WSW of Winster, 1st Lime Hummock, No. 3, E of East Bradford and Lathkil Ridge.

Grinah Stones, in Hope Woodlands, 1st Grit, No. 8, E of the Grand Ridge.

Grindlow Rime, near Edale Chapel, a Hummock of, 1st Grit, No. 2, S of North Noe Ridge.

Grin Hill, near Buxton, 4th Lime, surrounded nearly by lime-kiln heaps, Pools-hole Cavern under it, No. 30, E of Grand Ridge.

Grooby Town, in Leicestershire, Sienite, quarries for paving, No. 12, S of Charnwood Ridge.

Gun Hill, N of Leek, in Staffordshire, high, Shale and shale Grit, No. 36, on Grand Ridge.

Gun Hill, near Windley, in Duffield, quartz Gravel, on Shale, No. 4, on East Morledge Ridge.

Haddon Field, S of Bakewell, 1st Lime and Shale, Lime Quarries, No. 23, on South Wye Ridge.

Haddon Park, S E of Bakewell, Shale and shale Grit, No. 37, W of East Wye Ridge.

Hag Windmill-hill, in Dale Abbey, salmon-coloured Grit, No. 68, E of East Derwent Ridge.

Hallam Post-hill, near Fullwood, in Yorkshire, 1st Grit, No. 19, E of East Derwent Ridge.

Hamer Cliff, near Markfield, Leicestershire, coarse Slate, No. 17, N of Charnwood Ridge.

Hamilton Hill, in Nottinghamshire, N E of Mansfield, quartz Gravel, on yellow Lime, No. 3, N of South Idle Ridge.

Hanbury, Staffordshire, Red Marl, No. 23, E of West Churnet and Dove Ridge.

Hanging-stone Hill, near Woodhouse-eaves, Leicestershire, coarse Slate, No. 34, N of Charnwood Ridge.

Hansworth Town, Yorkshire, 12th Grit, No. 21, E of West Rother Ridge.

Harboro Rocks, in Brassington, 3rd Toadstone, or Dunstone, very high, a Well and Hermitage near the top, No. 74, on West Derwent Ridge.

Hardwick Park, near Alt Hucknal, yellow Lime, No. 2, on East Rother Ridge.

Haredge, N N E of Matlock, 2nd Grit, No. 3, W of West Amber Ridge.

Hare Hill and Clump, near Sudbury Park, quartz Gravel, on Red Marl, No. 13, S of South Schoo Ridge.

Harper Hill, near Buxton in Hartington, 4th Lime, No. 4, on West Derwent Ridge.

Harrack Hill, S of Ashford, Shale Limestone, No. 21, N of South Wye Ridge.

Harridge Pike, in Cheshire, near Staley Bridge, No. 7, N of North Ethrow Ridge.

Harrop Edge, near Mottram, in Cheshire, 3rd Grit, No. 11, on North Ethrow Ridge.

Harstoft Common, in Alt Hucknal, Grit, No. 50, on East Derwent Ridge.

Harthill Town, Yorkshire, salmon-coloured Grit, No. 17, E of East Rother Ridge.

Hartle Moor, S of Yolgrave, 1st Grit, No. 12, W of East Bradford and Lathkil Ridge.

Harwood Hill, in Beely, 3rd Grit, No. 36, on East Derwent Ridge.

Hascar Hill, near Hopton, Shale and shale Grit, No. 77, W of West Derwent Ridge.

Hathern Hill, NW of Loughborough, Leicestershire, Red Marl, No. 10, E of West Soar Ridge.

Hathersage Ridge, in Hathersage, 2nd Grit, the Hathersage Station of the Government Trigonometrical Survey, No. 26, on East Derwent Ridge.

Hawksley Hill, NW of Mount Sorrel, in Leicestershire, Sienite, No. 4, N of Charnwood Ridge.

Hawthorn Hill, N of Staveley, 12th Coal Shale, No. 9, on West Dolee Ridge.

Hay Hill, in Ashover, 1st Grit, No. 11, E of West Amber Ridge.

Hazlecross Hill, near Kingsley, Staffordshire, 2nd Grit, No. 9, E of West Churnet and Dove Ridge.

Hazlehour Hill, N of the Church, Staffordshire, Red Marl, No. 13, on South Mease Ridge.

Hazlewood Hill, SW of Belper, Shale, No. 18, W of East Ecclesburn Ridge.

Heanor Windmill-hill, S E of the Town, quartz Gravel, on Coal Shale, No. 1, on East Nutbrook Ridge.

Heath Hill, SW of the Town, 12th Grit? No. 3, E of East Dolee Ridge.

Heath House, near Cheddleton, Staffordshire, Shale, No. 6, E of West Churnet and Dove Ridge.

Heathy Low, at Hargate Wall, in Wormhill, 2nd Toadstone, No. 24, E of Grand Ridge.

Heaver Clump, near Kniveton, Shale-Limestone, No. 4, N of North Schoo Ridge.

Heights of Abraham, near Matlock Bath, 1st Lime and 1st Toadstone, No. 10, E of East Bradford and Lathkil Ridge.

Hell-field Moor, 2½*m.* W of Bradfield Chapel, in Yorkshire, 1st Grit, No. 8, E of East Derwent Ridge.

Hen Low, near Heathcote in Hartington, 4th Lime, No. 37, W of West Derwent Ridge.

Henmore, near Belper, 4th Grit, No. 1, on West Bootle Ridge.

Hentley Hill, S of Castleton, 3rd Lime, No. 9, E of East Wye Ridge.

Herding Hill, N E of Norton, 7th Grit, high, No. 14, on West Rother Ridge.

Higger Tor, E of Hathersage, a Hummock of the 1st Grit, No. 22, W of East Derwent Ridge.

High Cliff, at Cowdale, near Buxton, 4th Lime, No. 7, E of West Derwent Ridge.

High Cross, near High Needham in Hartington, 4th Lime, No. 26, W of West Derwent Ridge.

High Edge, near Brand in Hartington, 4th Lime, No. 2, W of West Derwent Ridge.

High-field Farm, S of Dronfield, 9th Grit, high, No. 4, E of West Rother Ridge.

High-lane Hill, NW of Eckington, N of the Houses, 9th Grit, No. 15, E of West Rother Ridge.

High Lees, S of Harston, in Matlock, 1st Grit, very high, No. 8, W of West Amber Ridge.

High Low, near Abney in Hope, Shale and shale Grit, No. 8, S of South Noe Ridge.

High Low, near Brierley-foot Bar in Hartington, 4th Lime, No. 10, on West Derwent Ridge.

High Low, N of Monyash, 1st Lime, Bird's-eye Marble quarry S E, No. 15, on South Wye Ridge.

High Moor, E of Killamarsh, Coal Shale, No. 19, W of East Rother Ridge.

High Oredish, near Trinity Chapel in Brackenfield, 1st Grit, No. 10, E of West Amber Ridge.

High Roches, E of Swithamly, near Flash, in Staffordshire, 1st Grit, very high, No. 35, on Grand Ridge.

High-shut Hill, near Cheadale, in Staffordshire, quartz Gravel, No. 10, E of West Churnet and Dove Ridge.

High Stones, 5 *m.* WNW of Bradfield Chapel, in Yorkshire, on 1st Grit, No. 4, on East Derwent Ridge.

High Tor, near Matlock Bath, 1st Lime (see Section in *Plate* V.), No. 7, W of West Amber Ridge.

High Wheeldon, near Church Sterndale in Hartington, 4th Lime, No. 17, W of West Derwent Ridge.

High Wood, near Bar Gate, S E of Belper, 3rd Grit, No. 2, on West Bootle Ridge.

Hill Head, near Brierley-foot Bar in Hartington, 4th Lime, No. 9, E of West Derwent Ridge.

Hillock Low (or Elklow), near Newhaven, in Hartington, very high, 4th Lime, No. 59, on West Derwent Ridge.

Hill-top, SW of Dronfield, 9th Grit and 8th Coal-shale, No. 3, E of West Rother Ridge.

Hill-top, in Shottle, near Iderich-hay, Shale and shale Grit, No. 14, W of East Ecclesburn Ridge.

Hoe Cliff, in Brassington pastures, 4th Lime, No. 70, W of West Derwent Ridge.

Holbrook Moor, N NW of the Town, 3rd Grit, No. 3, on West Bootle Ridge.

Holden Moor, 3 *m.* E of Bradfield Chapel, in Yorkshire, on 1st Grit, No. 5, on East Derwent Ridge.

Holland Hill, N of Arnold, Notts, Red Marl, high, a

Station (Holan) in the Government Trigonometrical Survey, No. 3, on East Leen Ridge.

Hollingsworth Head, near Chunal in Glossop, 1st Grit and 1st Coal-shale, No. 1, on South Shelf Ridge.

Hollington Heath, near Cheadale, Staffordshire, quartz Gravel, No. 13, E of West Churnet and Dove Ridge.

Hollington Hill, S of Uttoxeter, Staffordshire, quartz Gravel, on Red Marl, No. 17, E of West Churnet and Dove Ridge.

Hollington Village, in Longford, Red Marl, No. 5, S of South Schoo Ridge.

Holly Hill, in Clown, yellow Lime, No. 13, E of East Rother Ridge.

Holmesfield Village, near Dronfield, 5th Grit, No. 2, on West Rother Ridge.

Holm Moss, near Woodhead, between Yorkshire and Cheshire, deep peat on 2nd Grit Rock: the Huddersfield Turnpike-road crosses this Moss, at a greater elevation perhaps than any Road south of this in England, No. 1, on Grand Ridge.

Holy-moor Top, in Brampton, 3rd Grit, No. 37, E of East Derwent Ridge.

Homerton Nose, near Wincle Chapel, Cheshire, 1st Grit, No. 7, on North Dane Ridge.

Honey Hill, in Chilcote, between Derbyshire and Warwickshire, Red Marl, No. 5, on South Mease Ridge.

Hoon Hill (and Mount), near Church Broughton, Red Marl, No. 9, S of South Schoo Ridge.

Hopwell-hall, near Ockbrook, Red Marl, No. 74, on East Derwent Ridge.

Horse Stones, 4½ *m.* WSW of Midhope, in Yorkshire, 1st Grit, No. 1, on East Derwent Ridge.

Hotchley Hill, near West Leek, Nottinghamshire, Clay on Lias Limestone, No. 3, on East Soar and Eye Ridge.

Hough Hill, in Cheshire, near Staley Bridge, 3rd Grit, No. 9, N of North Ethrow Ridge.

Hough Park Clump, near Bradley, quartz Gravel, on Shale, No. 1, S of South Schoo Ridge.

Houghton Hill, near Whitwick, Leicestershire, coarse Slate, No. 55, on Charnwood Ridge.

Hound Hill, near Marchington, Staffordshire, Red Marl and Gypsum quarries, No. 21, E of West Churnet and Dove Ridge.

Howth Hill, N of Treton, Yorkshire, salmon-coloured Grit, No. 22, E of West Rother Ridge.

Hucknal Windmill-hill, in Nottinghamshire, yellow Lime, No. 53, on East Derwent Ridge.

Hulland Ward Village, in Ashburne parish, Shale, No. 83, on West Derwent Ridge.

Hunters Hill, near Swithland, Leicestershire, coarse Slate, No. 26, N of Charnwood Ridge.

Hunters Knoll, near Ilam, Staffordshire, 4th Lime, No. 18, E of East Churnet Ridge.

Hurdlow Hill, near Hurdlow in Hartington, 4th Lime, No. 19, W of West Derwent Ridge.

Hurdlow-house Hill (Duke of York), in Hartington, 2nd Lime, No. 23, on West Derwent Ridge.

Hurs Low, near Grindon, Staffordshire, Shale Limestone, No. 3, on West Manifold Ridge.

Ilam Low, 1¼ *m.* N of Ilam, Staffordshire, 4th Lime, high, No. 19, on East Manifold Ridge.

Ilkeston Church Hill, Grit, No. 3, on East Nutbrook Ridge.

Inkersall, near Staveley, 13th Grit, No. 8, on West Dolee Ridge.

Ipley Hill and Clump, near Brassington, 4th Lime, No. 71, W of West Derwent Ridge.

Ipstone Edge, N and N E of the Town, Staffordshire, 1st Grit and Shale, No. 6, on East Churnet Ridge.

Irish Hill, near Bardon Hill, Leicestershire, coarse Slate, No. 48, S of Charnwood Ridge.

Islington Hill, S W of Winster, 2nd Lime, No. 2, E of East Bradford and Lathkil Ridge.

Ivesbead Hill, in Charnwood Forest, Leicestershire, coarse Slate, No. 41, N of Charnwood Ridge.

Jackson's Edge, near Disley, Cheshire, 3rd Grit, No. 10, on West Goyte Ridge.

Kegworth Windmill-hill, NW of the Town, Leicestershire, Red Marl, No. 18, E of West Soar Ridge.

Kems Hill, in Peak Forest, 4th Lime, No. 23, E of Grand Ridge.

Kerridge, near Macclesfield, Cheshire, 4th Grit, large Quarries, No. 5, N of North Dane Ridge.

Kinder Scout Hills, near Hayfield, between Hope and Glossop Liberties, 1st Grit, the second in height in Derbyshire, No. 16 and 17, on Grand Ridge.

Kingsley Moor, near Kingsley, Staffordshire, 2nd Coal Shale, No. 7, E of West Churnet and Dove Ridge.

King's Newton, near Melborne, Red Marl, No. 10, N of North Mease Ridge.

Kinsley Hill on Rothley Plain, near Mount Sorrel, Leicestershire, Sienite, No. 7, N of Charnwood Ridge.

Kiveton Park, near South Anston, Yorkshire, No. 21, on East Rother Ridge.

Knitaker Hill, in Barlborough, yellow Lime on Coal-measures, No. 12, on East Rother Ridge.

Kniveton Hill, E of the Town, Shale-Limestone, No. 2, on North Schoo Ridge.

Knot Low, in Wormhill, a Hummock of 2nd Toadstone, No. 25, E of Grand Ridge.

Ladycross Hill, near Woodhead, on the Penistone Road, in Yorkshire, 2nd Grit, No. 5, on Grand Ridge.

Ladylee Hill, near Lullington, Red Marl, No. 27, S of North Mease Ridge.

Langton Arbour, SW of Blidworth, Nottinghamshire, quartz Gravel, No. 2, on East Leen Ridge.

Larle Tor, near Brassington, 4th Lime, No. 1, on North Schoo Ridge.

Laughton-le-Morthen Town, Yorkshire, yellow Lime, high, No. 27, E of East Rother Ridge.

Lean Low, near Heathcote in Hartington, 4th Lime, No. 35, W of West Derwent Ridge.

Leek Common, E of the Town, Staffordshire, Shale and shale Grit, No. 4, W of East Churnet Ridge.

Lindow-Lane Hill, 3 *m.* S of Ashover, a Hummock of 2nd Grit, No. 14, on West Amber Ridge.

Linton Village, near Church Gresley, Gravel on Red Marl, No. 21, on North Mease Ridge.

Little-Edges, near Aldward NW, in Brassington, 3rd Lime, No. 64, E of West Derwent Ridge.

Little Hallam Hill, near Ilkeston, Grit, No. 4, on East Nutbrook Ridge.

Little Over Town, Gravel on Red Marl, No. 94, on West Derwent Ridge.

Litton Edge, N of the Village, near Tideswell, 1st Lime, No. 24, W of East Wye Ridge.

Longclay Hill, on Rothley Plain, near Mount Sorrel, Leicestershire, Sienite, No. 5, on Charnwood Ridge.

Long Cliff, WSW of Castleton, 4th Lime, No. 12, on East Wye Ridge.

Longhill,

Long Hill, near Whitwick, Leicestershire, coarse Slate, No. 51, on Charnwood Ridge.

Longlane Hill, at Upper Thurvaston in Longford, Red Marl, No. 1, on East Dove Ridge.

Longroods Hill, NW of Foolow, near Grindlow, 1st Lime, No. 25, on East Wye Ridge.

Longway Bank, near Alderwasley in Wirksworth, 2nd Grit and 1st Coal-Shale, No. 7, E of East Ecclesburn Ridge.

Lords Seat, near Castleton, Shale and shale Grit, very high, a Station in the Government Trigonometrical Survey, No. 1, on East Wye Ridge.

Lords Seat, near Fullwood, in Yorkshire, 2nd Grit, No. 16, E of East Derwent Ridge.

Lose Hill, near Castleton, Shale and shale Grit, No. 3, on East Wye Ridge. N. B. its NW end is called Back Tor, and is much slipt.

Lost-lad, near Derwent Chapel, between Derbyshire and Yorkshire, 1st Grit, No. 9, on East Derwent Ridge.

Loxley Green, near Kingston, Staffordshire, quartz Gravel, on Red Marl, No. 16, on West Churnet and Dove Ridge.

Lubscloud Hill, in Charnwood Forest, Leicestershire, coarse Slate, No. 40, N of Charnwood Ridge.

Lullington Town, Gravel on Red Marl, No. 26, S of North Mease Ridge.

Lygate Hill, N of the Village, near Holmesfield, 4th Grit, No. 1, on West Rother Ridge.

Macclesfield Town, Cheshire, quartz Gravel, on Red Marl? No. 10, on North Dane Ridge.

Maghill-Bowse Clump, near Atlow-win in Atlow, high, Shale-Limestone, No. 3, S of North Schoo Ridge.

Maltby Hill, Yorkshire, yellow Lime, No. 1, on North Idle Ridge.

Mam Tor, near Castleton, Shale, great slips, high, No. 2, on East Wye Ridge.

Mansell Park, near Hulland Ward, Shale, and Gravel, on Red Marl, the great fault crosses it, No. 85, on West Derwent Ridge.

Mansfield Windmills-Hill, S E of the Town, quartz Gravel, and Gravel Rock on yellow Lime, No. 4, N of South Idle Ridge.

Marchington Cliff, S of the Town, Staffordshire, Shale on Red Marl, No. 20, on West Churnet and Dove Ridge.

Markfield Toll-Bar, N of the Town, in Leicestershire, coarse Slate, No. 13, on Charnwood Ridge.

Markfield Windmill-hill, Leicestershire, high conical, Sienite, No. 14, S of Charnwood Ridge.

Marple Chapel, Cheshire, 3rd Grit, No. 11, on West Goyte Ridge.

Marston Moor, SW of Barlborough, 13th Grit, No. 11, W of East Rother Ridge.

Marston Park, in Marston Montgomery, Red Marl, No. 14, S of South Schoo Ridge.

Martin-shaw Wood, near Grooby, Leicestershire, coarse Slate, No. 11, S of Charnwood Ridge.

Masson Low, near Matlock Bath, 2nd Toadstone (see Section in *Plate* V.), very high, No. 9, E of East Bradford and Lathkil Ridge.

Mickleover Town, Red Marl, No. 91, W of West Derwent Ridge.

Middle Handley, NW of Staveley, 9th Grit, No. 11, E of West Rother Ridge.

Middle Peak, N of Wirksworth, 3rd Lime, No. 4, on East Ecclesburn Ridge.

Middleton Intake, NW of Wirksworth, 3rd Lime, No. 1, on East Ecclesburn Ridge.

Middleton Moor race-course, near Wirksworth, 3rd Lime, No. 2, on East Ecclesburn Ridge.

Midway Houses, near Hartshorn, Red Clay, No. 5, on Ashby and Burton Ridge.

Milford Bank, W of the Village, near Belper, 1st Grit, No. 19, on East Ecclesburn Ridge.

Minning Low, near Pike Hall in Bradburne, 4th Lime, No. 61, E of West Derwent Ridge.

Mins Hill, near Wincle Chapel, Cheshire, Shale and shale Grit, No. 8, S of North Dane Ridge.

Mixon Hill, near Upper Elkstone, Staffordshire, Shale Limestone and Copper Mines, No. 3, E of East Churnet Ridge.

Mock-Beggar Hall (or Robin-Hood's Stride), N of Elton, 1st Grit? Hummock, No. 13, W of East Bradford and Lathkil Ridge.

Mole-copt Hill, between Staffordshire and Cheshire, coarse Grit Rocks of the upper Coal series, No. 41, on Grand Ridge.

Moor-cock Hall, on Moredge, near Upper Elkstone, Staffordshire, Shale and shale Grit, No. 2, on East Churnet Ridge.

Moor-Top House, E of Dronfield, 10th Grit, No. 8, E of West Rother Ridge.

Moot-low, near Aldwark in Brassington, 4th Lime, No. 67, E of West Derwent Ridge.

Moredge Hill, E of Leek, Staffordshire, Shale and shale Grit, No. 5, on East Churnet Ridge.

Morley Hill, in Charnwood Forest, Leicestershire, coarse Slate, No. 42, N of Charnwood Ridge.

Morthen Hill, near Wickersley, Yorkshire, Grit, No. 30, on East Rother Ridge.

Mosborough Hall, near Eckington, 11th Grit, No. 17, E of West Rother Ridge.

Mossey Low, near Pilsbury in Hartington, 4th Lime, No. 28, W of West Derwent Ridge.

Mote-Low Arbor, near Alsop, 4th Lime, high, No. 49, W of West Derwent Ridge.

Mottram Hill, N of the Church, Cheshire, a Hummock of 4th Grit, No. 10, S of North Ethrow Ridge.

Mount Pleasant, NW of Belper, 2nd Grit, No. 12, E of East Ecclesburn Ridge.

Mount Sorrel Windmill-hill, W of the Town, in Leicestershire, Sienite, No 2, on Charnwood Ridge.

Mouse Low, NW of Glossop, 2nd Grit, No. 2, on North Shelf Ridge.

Musden Low, near Calton, Staffordshire, 4th Lime, No. 17, E of East Churnet Ridge.

Nabs Buts, at Hargate Wall in Wormhill, a 2nd Lime Hummock, No. 24, E of Grand Ridge.

Nabs Hill, at Hanson Grange, near Alsop, 4th Lime, No. 49, W of West Derwent Ridge.

Nabs Nose, near Macclesfield, Cheshire, 4th Grit, grey Slate Pits, high, No. 2, N of North Dane Ridge.

Nels Low, N E of Peak Forest Town, on Hummock of 3rd Lime, No. 15, W of East Wye Ridge.

Newborough Windmill-hill, W of the Town, Staffordshire, loamy Gravel on Red Marl, No. 19, W of West Churnet and Dove Ridge.

Nether Haddon Pasture-head, E N E of Over Haddon, 1st Lime, No. 22, on South Wye Ridge.

Newhall Windmill-hill, near Bretby, Grit, No. 6, S of Ashby and Burton Ridge.

Newton Linford Hill, N E of the Town, in Leicestershire,

shire, part Sienite and part coarse Slate, No. 24, N of Charnwood Ridge.

Normanton Common, in South Normanton, Coal Shale, No. 55, on East Derwent Ridge.

Normanton Hill, S of Derby, Red Marl, No. 98, on West Derwent Ridge.

Normanton on the Heath, Leicestershire, Red Marl, No. 2, on South Mease Ridge.

North Anston Hill, near South Anston, Yorkshire, yellow Lime, No. 28, E of East Rother Ridge.

Nottingham Windmills-hill, N W of the Town, quartz Gravel, No. 5, on East Leen Ridge.

Nuns Hill, N N E of Bolsover, Grit, Grindstone quarry, No. 9, W of East Rother Ridge.

Oaker Hill, near Wensley, Shale and shale Grit, Slips, No. 8, E of East Bradford and Lathkil Ridge.

Odd-house Hill, near Measham, between Derbyshire and Leicestershire, Red Clay, No. 3, S of Ashby and Burton Ridge.

Offin Stone, between Yorkshire and Cheshire, near Mossley, 1st Grit, No. 4, N of North Ethrow Ridge.

Ogstone Hill, in Moreton, 4th Grit, No. 12, E of West Amber Ridge.

Old Booth Edge, in Hathersage, 1st Grit, W of East Derwent Ridge, the famous Peak Mill-stone Quarry, No. 24, on East Derwent Ridge.

Old Field Low, N of Waterfall, Staffordshire, 4th Lime, No. 5, W of West Manifold Ridge.

Old John Hill, in Bradgate Park, near Newton Linford, Leicestershire, coarse Slate, No. 22, N of Charnwood Ridge.

Old Park, between Leicestershire and Derbyshire, near Smithsby, No. 5, on North Mease Ridge.

Old Ridge, near Lees, in Kingsley, Staffordshire, 2nd Grit, No. 12, W of East Churnet Ridge.

Old Woman, a heap of Sods, on Peat upon Shale, between Hope and Glossop Liberties; on Doctor Gate, an ancient or Roman Horse Road from Brough to Melandra, No. 13, on Grand Ridge.

One Ash Clump, near Monyash, 1st Lime, No. 33, E of West Derwent Ridge.

Onestone Hill, N of the Village near Dronfield, a Hummock of 11th Grit, No. 13, E of West Rother Ridge.

Orton on the Hill, Leicestershire, No. 4, S of South Mease Ridge.

Osgathorpe Hill, S of the Village near Belton, in Leicestershire, Red Marl, No. 8, E of West Soar Ridge.

Outwoods, near Woodhouse-eaves, Leicestershire, coarse Slate, No. 35, N of Charnwood Ridge.

Over Moor, near Tibshelf, between Derbyshire and Nottinghamshire, Coal Shale, No. 52, on East Derwent Ridge.

Over Seal Town, Leicestershire, Red Marl, No. 22, S of North Mease Ridge.

Over-street, near Hurdlow in Hartington, 3rd Lime, No. 22, on West Derwent Ridge.

Over Stones, N E of Hathersage, 1st Grit, No. 21, W of East Derwent Ridge.

Overton Park, SW of Ashover, 1st Grit, very high, No. 4, on West Amber Ridge.

Oxlow, 1 *m.* N E of Peak Forest Town, 4th Lime, No. 13, W of East Wye Ridge.

Ox Stones, between Hathersage and Dore Liberties, near Yorkshire, 2nd Grit, No. 25, on East Derwent Ridge.

Park Hall, near Mapperley, No. 65, E of East Derwent Ridge.

Park Hill, W of Aston, Yorkshire, 13th Grit, No. 24, W of East Rother Ridge.

Park-House Hill, at Dowall in Hartington, 4th Lime, No. 13, W of West Derwent Ridge.

Park-Lane Head, E of Crich, 3rd Grit, No. 18, E of West Amber Ridge.

Pearl Hill, E of Kirkby, in Nottinghamshire, quartz Gravel, on yellow Lime, small ochry Geodes (called *Pearls)*, No. 1, on East Erewash Ridge.

Peters Hill, S of Derby, Gravel on Red Marl, No. 97, E of West Derwent Ridge.

Peters Pike, in Brassington Pastures, 4th Lime, No. 69, W of West Derwent Ridge.

Pet Hill, near Brushfield and Monsal Dale, 2nd Lime and 2nd Toadstone, No. 12, N of South Wye Ridge.

Petycroft Hill, near Tamworth, Staffordshire, Red Marl, No. 10, on South Mease Ridge.

Picking Stones, near Chisworth in Glossop, 3rd Grit, No. 4, S of South Shelf Ridge.

Pike Low, 3½ *m.* W of Bolterstone Chapel, in Yorkshire, 1st Grit, No. 3, E of East Derwent Ridge.

Pike Low, near Caldon, Staffordshire, 1st Grit, No. 11, on East Churnet Ridge.

Pike Low, E of Waterfall, Staffordshire, 4th Lime, No. 6, W of West Manifold Ridge.

Pine Low, near Hartington, 4th Lime, No. 39, W of West Derwent Ridge.

Pistern Hill, N of Smithsby, Grit, No. 7, N of North Mease Ridge.

Priestcliff Lees, N E of the Village, near Taddington, 2nd Lime, No. 10, N of South Wye Ridge.

Priestcliff Low, near Taddington, 2nd Lime and 2nd Toadstone, No. 11, N of South Wye Ridge.

Priestwood Hill, near Meynel Langley and Keddleston Park, Red Marl, No. 88, E of West Derwent Ridge.

Pudding-pie Hill, near Brampton, 4th Grit, No. 33, on East Derwent Ridge.

Quarn Hill, N N W of Allestry, quartz Gravel, on Shale, No. 6, on East Morledge Ridge.

Queens Bower, SW of Blidworth, Nottinghamshire, quartz Gravel, No. 1, on East Leen Ridge.

Radburne Hall, in Radburne, Red Marl, No. 90, W of West Derwent Ridge.

Rainow Low, N of Rainow Chapel, Cheshire, 4th Grit, No. 5, W of West Goyte Ridge.

Ramshaw Rocks, near Flash, in Staffordshire, 1st Grit, No. 34, on Grand Ridge.

Red Hill, N of Arnold, Notts, Red Marl, No. 4, W of East Leen Ridge.

Red Hill, near Ratcliff, Nottinghamshire, Red Marl and Gypsum Quarries, No. 1, on East Soar and Eye Ridge.

Renishaw Hill, near Eckington, 10th Grit, No. 10, E of West Rother Ridge.

Repton Hill, W of the Town, Red Marl, No. 8, N of Ashby and Burton Ridge.

Revedge Hill, near Warslow, Staffordshire, a Hummock of 1st Grit, No. 2, E of West Manifold Ridge.

Reynards Tor, in Brassington Pastures, 4th Lime, No. 72, W of West Derwent Ridge.

Riber Top, S E of Matlock, 1st Grit (see Section in *Plate* V.), very high, No. 6, W of West Amber Ridge.

Ricklow-dale Head, near Hunter's Meer, S of Sheldon, 1st Lime, No. 19, S of South Wye Ridge.

Ridge Coit, near Barmoor Clough, in Peak Forest, 3rd Lime, No. 26, on Grand Ridge.

Riletch Hill, near Upper Elkstone, Staffordshire, Shale Limestone, and Copper Mines, No. 1, on West Manifold Ridge.

Riley Hill, N E of Eyam, Shale and shale Grit, No. 4, S of South Noe Ridge.

Ripley Village, in Pentrich, No. 1, on South Amber Ridge.

Risley Park, N W of the Town, high, Red Marl, No. 73, on East Derwent Ridge.

Risley Windmill-hill, N E of the Town, Red Marl, No. 72, E of West Derwent Ridge.

Robin-Hood's Stride. See *Mock-Beggar Hall.*

Roby Field, in Denby, Grit, No. 63, on East Derwent Ridge.

Rocester Common, W of the Town, Staffordshire, Red Marl, No. 12, E of West Churnet and Dove Ridge.

Roches Rock, in Ashover, 1st Grit, famous Fire Stone Quarry, No. 39, on East Derwent Ridge.

Roches. See *High Roches.*

Rock Hall, N E of Eyam, a Hummock of 1st Grit, No. 3, S of South Noe Ridge.

Roe Hill, near Austrey, between Leicestershire and Warwickshire, Red Marl, No. 3, on South Mease Ridge.

Rosleston Town, Gravel, on Red Marl, No. 25, N of North Mease Ridge.

Rothley Hill, at S E corner of the Plain, Leicestershire, quartz Gravel, on Red Marl, No. 8, on Charnwood Ridge.

Rough Heanor, near Derby, Red Marl, No. 89, on West Derwent Ridge.

Rowlee Peat-Pits, in Hope Woodlands, on shale Grit, No. 2, on East Ashop Ridge.

Rowter Rocks, at Birchover, near Winster, 1st Grit Hummock? No. 15, W of East Bradford and Lathkil Ridge.

Rud Hill, near Fullwood, in Yorkshire, 2nd Grit, No. 18, E of East Derwent Ridge.

Rushop Edge, between Peak Forest and Hope Woodland Liberties, Shale and shale Grit, No. 21, on Grand Ridge.

Ryda Hill, in Brassington, 4th Lime, No. 73, on West Derwent Ridge.

Sandbeck Park, Yorkshire, yellow Lime (Roche-Abbey Quarries near), No. 2, on North Idle Ridge.

Scampton Hill, SW of Mount Sorrel, in Leicestershire, Sienite, No. 3, S of Charnwood Ridge.

Scraper Low, S E of Hathersage, Shale and shale Grit, No. 23, W of East Derwent Ridge.

Scropley Hill and Clump, S E of Burton Town, Red Marl, No. 12, on Ashby and Burton Ridge.

Seal Grange, near Nether Seal, Leicestershire, Red Marl, No. 23, S of North Mease Ridge.

Seal-stone Hill, near Rowlee, in Hope Woodlands, 1st Grit, No. 1, on North Noe Ridge.

Selstone Park, N E of the Town, in Nottinghamshire, No. 3, W of East Erewash Ridge.

Seven Hands, or New Road-meetings, on Needwood Forest, loamy Gravel, on Red. Marl, No. 22, on West Churnet and Dove Ridge.

Shack Low, N of Sheldon, 1st Lime, No. 17, on South Wye Ridge.

Sharp Cliff, N W of Ipstone, Staffordshire, Gravel Rock? on 1st Grit, No. 7, W of East Churnet Ridge.

Sharp Hill, near the Reservoir on Charnwood Forest, Leicestershire, coarse Slate, No. 54, N of Charnwood Ridge.

Sharrat Cliff (or Shady Cliff), near Aldwark N E, in Brassington, 3rd Lime, No. 65, E of West Derwent Ridge.

Shatton Edge, S of the Village, near Hope, Shale and shale Grit, No. 7, on South Noe Ridge.

Sheen Hill, N of the Town, Staffordshire, a Hummock of 1st Grit, on Shale, No. 5, on East Manifold Ridge.

Sheepston Hill, S W of Annesley, Notts, a Hummock of Gravel, on Coal Shale, No. 4, on East Erewash Ridge.

Sheffield Manour (Summer-house), E of the Town, Yorkshire, 11th Grit, No. 20, W of West Rother Ridge.

Sheldon Town-head, W of the Village, 1st Lime, No. 16, on South Wye Ridge.

Shelf Stones, S of Woodhead, between Hope and Glossop Liberties, 1st Grit, No. 11, on Grand Ridge.

Shepherd's Moss-House Hill, N W of Ouler Toll-Bar in Holmesfield, 2nd Grit, No. 27, on East Derwent Ridge.

Shipley Park, in Heanor, Grit, No. 64, E of East Derwent Ridge.

Shipley-wood Hill, near Ilkeston, No. 2, on East Nutbrook Ridge.

Shirley Common, near Shirley, quartz Gravel, on Coal-measures? No. 4, S of South Schoo Ridge.

Shottle Gate Hill, N E of the Village, near Turnditch, Shale, No. 15, on East Ecclesburn Ridge.

Shutlings Low, near Forest Chapel, Cheshire, a Hummock of 1st Grit, very high and remarkable, No. 6, on North Dane Ridge.

Sinai Park, near Burton, Staffordshire, Red Marl, No. 29, W of West Churnet Ridge.

Sir William Hill, N of Eyam, the old Sheffield Turnpike Road over it! 1st Grit, a very high point, No. 2, S of the South Noe Ridge.

Slag Hills, near Dowey-hole Lane, near Ashover, 2nd Grit, very high, No. 5, on West Amber Ridge.

Slipper Low, S S E of Taddington, 2nd Lime, No. 8, on South Wye Ridge.

Smithsby Common, N of the Town, alluvial blue Clay, on Red Clay, No. 6, on North Mease Ridge.

Smithsby Windmill-hill, near Ashby-de-la-Zouch, Red Clay, No. 4, on Ashby and Burton Ridge.

Snaper Hill, near Brailsford, Red Marl, No. 87, on West Derwent Ridge.

Snelston Common, S E of the Town, loamy quartz Gravel, on Coal-measures? No. 10, on South Schoo Ridge.

Somercoats-Green, in Alfreton, Coal Shale, No. 57, on East Derwent Ridge.

Sough Top, N E of Chelmerton, 2nd Lime, high, No. 3, on South Wye Ridge.

South Anston Hill, S W of the Town, Yorkshire, yellow Lime, and salmon-coloured Grit, the great fault through it, No. 22, E of East Rother Ridge.

South-head Tor, near Chapel-en-le-Frith, 1st Grit, No. 19, W of Grand Ridge.

Spink Hill Windmill-hill, SW of the Village, 11th Grit, No. 18, W of East Rother Ridge.

Spite-winter Hill, in Ashover, on the Chesterfield Road, 2nd Grit, No. 41, on East Derwent Ridge.

Spondon Hill, W of the Town, Red Marl, No. 70, W of East Derwent Ridge.

Spring Wood, near Cole Orton, Leicestershire, No. 2, on North Mease Ridge.

Staden Hill, near Buxton, 3rd Toadstone, No. 6, E of West Derwent Ridge.

Stake Hill, near Stannington, in Yorkshire, 2nd Grit, a Game-keeper's house on it, No. 11, on East Derwent Ridge.

Stake Top, near Moss Houses, on the Buxton and Macclesfield Road, very high, Peat, on 2nd Grit, No. 1, on West Goyte Ridge.

Stanage Hill and Clumps, in Wingerworth, 3rd Grit, No. 42, E of East Derwent Ridge.

Stanage Hill, near Hathersage, between Derbyshire and Yorkshire, 1st Grit, No. 15, on East Derwent Ridge.

Stanage Pole, near Fullwood, between Derbyshire and Yorkshire, 2nd Grit, No. 17, on East Derwent Ridge.

Stanton Hill, near Newhall, Gravel, No. 11, S of Ashby and Burton Ridge.

Stanton Moor, near Winster, a large Hummock of 1st Grit, No. 14, on East Bradford and Lathkil Ridge.

Steep Low, ½ *m.* NW of Alstonfield, Staffordshire, a Hummock of 4th Lime, No. 12, E of East Manifold Ridge.

Stenson Hill, in Barrow, Gravel on Red Marl, No. 95, W of West Derwent Ridge.

Stewards Hay, S E of Markfield, Leicestershire, coarse Slate, with Sienite S of it, No. 10, on Charnwood Ridge.

Stone-house Rocks, S of Cromford, a 1st Grit Hummock, No. 6, E of Ecclesburn Ridge.

Stone Hill, on Belper Ward, N of the Town, 3rd Grit, high, No. 2, on South Amber Ridge.

Stoney-lee Rocks, near Yolgrave, coarse shale Grit? No. 16, W of East Bradford and Lathkil Ridge.

Stoney-fold Hill, near Bosley, Cheshire, Shale and shale Grit, No. 9, on North Dane Ridge.

Stoney-well Hill, near Markfield, Leicestershire, coarse Slate, No. 18, N of Charnwood Ridge.

Strelly Windmill-hill, N of the Town, Notts, yellow Lime, on Coal-measures, high, No. 10, on East Erewash Ridge.

Stretton Village, on 10th Grit, No. 49, on East Derwent Ridge.

Summercross Hill, W of Tideswell, high, 2nd Lime, No. 18, W of East Wye Ridge.

Summer Hill, E of Flash, Staffordshire, Shale and shale Grit, No. 1, on East Manifold Ridge.

Sutton Forest Hill, S E of the Town, Notts, quartz Gravel, very high, a Station (Sutton-Ashfield) in the Government Trigonometrical Survey, No. 2, on South Idle Ridge.

Sutton Hall, at Sutton in Scarsdale, 13th Grit, No. 4, on West Dolee Ridge.

Sutton Hill, SW of Sutton in Ashfield, Notts, yellow Lime, No. 54, on East Derwent Ridge.

Swannington Hill, S of the Village, near Cole Orton, in Leicestershire, Coal Shale, No. 11, on West Soar Ridge.

Swanwick Windmill-hill, in Alfreton, Coal Shale, No. 58, W of East Derwent Ridge.

Swarkstone Lows, in Swarkstone, Gravel, on Red Marl, No. 96, W of West Derwent Ridge.

Swincote Hill, near Blore, Staffordshire, Shale Limestone, No. 19, E of East Churnet Ridge.

Swithland Wood, near Swithland, Leicestershire, ancient Slate Quarries, No. 27, N of Charnwood Ridge.

Temple Normanton Town, 13th Grit? No. 2, W of West Dolee Ridge.

Tenter Bank, N of Miller's Dale Mill, in Tideswell, a Hummock of 2nd Lime, No. 21, W of East Wye Ridge.

Tenters Wood Hill, near Bagnall, Staffordshire, coarse Grit Rock of the upper Coal series, No. 2, on West Churnet and Dove Ridge.

Thatch Marsh, S E of Buxton, 2nd Grit, a Colliery, No. 28, on Grand Ridge.

Thirkelow, at Brand in Hartington, 4th Lime, No. 1, on West Derwent Ridge.

Thorpe Cloud, in Thorpe, near Ilam, 4th Lime, a sharp and wedge-like Hill (as Croom, No. 12), No. 51, W of West Derwent Ridge.

Thorpe Constantine, Staffordshire, Red Marl, No. 7, on South Mease Ridge.

Thor's-house Tor, 1 *m.* W S W of Wetton, Staffordshire, 4th Lime, a natural Arch and Cave, No. 18, W of East Manifold Ridge.

Three Lows, near Oak-moor Mill, Staffordshire, Shale and shale Grit, No. 14, W of East Churnet Ridge.

Thurcroft Hill, near Laughton, Yorkshire, yellow Lime, No. 29, E of East Rother Ridge.

Tidslow Top, on Tideswell Moor, N of the Town, high, 3rd Lime, No. 23, on East Wye Ridge.

Timberwood Hill, in Charnwood Forest, Leicestershire, coarse Slate, No. 49, S of Charnwood Ridge.

Tin Meadow Hill, in Charnwood Forest, Leicestershire, coarse Slate, No. 52, N of Charnwood Ridge.

Tithe Barn Hill, S of Alveton, Staffordshire, Red Marl, No. 11, E of West Churnet and Dove Ridge.

Toadman Hill, on Belper Ward, N of the Town, 2nd Grit, No. 4, on South Amber Ridge.

Todwick Grange, N W of the Town, Yorkshire, salmon-coloured Grit, No. 23, on East Rother Ridge.

Tra Cliff (or Tray Cliff), S E of Mam Tor, and N of the Winnets Road, near Castleton, 4th Lime, Fluor Mines in it, No. 5, E of East Wye Ridge.

Trowel Moor, near Wollaton, Notts, Coal Shale, No. 13, on East Erewash Ridge.

Tutbury Castle Hill, N W of the Town, Staffordshire, Red Marl, No. 25, E of West Churnet and Dove Ridge.

Ulley, near Aston, Yorkshire, salmon-coloured Grit, No. 25, on East Rother Ridge.

Underwood Village, Nottinghamshire, 4th Grit, No. 5, W of East Erewash Ridge.

Union Hill, in Ashby Woulds, Leicestershire, Grit, No. 18, S of North Mease Ridge.

Upper Holloway, N W of Crich, 1st Grit, No. 16, W of West Amber Ridge.

Upper Lane Farm (Read Denham's), near Hady, in Chesterfield, 5th Coal Shale, denudated, No. 6, W of West Dolee Ridge.

Upwood, in Doveridge, Red Marl, No. 15, S of South Schoo' Ridge.

Waggon Lows, near High Needham in Hartington, 4th Lime, No. 25, W of West Derwent Ridge.

Wain Stones, S of Woodhead, between Hope and Glossop Liberties, 1st Grit, No. 10, on Grand Ridge.

Walkley Bank, near Sheffield, in Yorkshire, 3rd Grit, Quarries, No. 20, E of East Derwent Ridge.

Wales Town, in Yorkshire, No. 20, on East Rother Ridge.

Wall-stone Edge, between Yorkshire and Cheshire, near Woodhead, 1st Grit, No. 3, on North Ethrow Ridge.

Wam (or Wham) Rake Head, S SW of Taddington, 2d Lime, No. 7, on South Wye Ridge.

Wanlip Hill, near the Village, N of Leicester, Red Marl, No. 4, E of West Soar Ridge.

Wardgate Hill, in Hulland, Gravel, No. 82, on West Derwent Ridge.

Wardlow Hay, S SW of the Village, 1st Lime, No. 28, W of East Wye Ridge.

Wardlow Top, S S E of the Village, 1st Lime, No. 27, W of East Wye Ridge.

Warren Hill, in Ashby Woulds, Leicestershire, Grit, No. 17, S of North Mease Ridge.

Warren Hill, near Whitwick, Leicestershire, coarse Slate, No. 50, on Charnwood Ridge.

Washington Green (Wessington), in Crich, 3rd Coal Shale, No. 13, E of West Amber Ridge.

Weaver Hill, near Wooton, Staffordshire, 4th Lime, very high, a Station in the Government Trigonometrical Survey, No. 21, on East Churnet Ridge.

Wensley Village, near Winster, Shale, and 1st Lime, No. 7, E of East Bradford and Lathkil Ridge.

Werneth Low, near Hyde Chapel, Cheshire, alluvial reddish Marl, on 3rd Grit, No. 12, on North Ethrow Ridge.

Weston Cliff, SW of Weston Town, Red Marl, Freestone Quarries, by the Grand Trunk Canal, No. 102, on West Derwent Ridge.

Wetley Moor, near Bagnall, Staffordshire, No. 3, on West Churnet and Dove Ridge.

Wetley Rocks, near Cheddleton, Staffordshire, 1st Grit, No. 5, E of West Churnet and Dove Ridge.

Whaley Moor, near Disley, Cheshire, 2nd Grit, high, No. 9, on West Goyte Ridge.

Whatton Hill, N of Long Whatton Town, Leicestershire, Red Marl, No. 17, E of West Soar Ridge.

Wheatcroft Village, N of Crich, 1st Coal Shale, No. 15, on West Amber Ridge.

Whetstone Bank, 1½ *m.* S E of Peak Forest Town, on Tideswell Moor, 3rd Lime, No. 17, W of East Wye Ridge.

White Low, E of Ible in Bonsal, 3rd Lime, No. 6, E of East Bradford and Lathkil Ridge.

White-shaw Hill, S E of Flash, Staffordshire, Shale and shale Grit, No. 2, on East Manifold Ridge.

Whimbury Knots, near Hayfield, 1st Grit, No. 15, W of Grand Ridge.

Whittle Hill, in Charnwood Forest, Leicestershire, Gravel, and Slate Whetstone Quarries, No. 36, N of Charnwood Ridge.

Whitwell Common, NW of the Town, yellow Lime, No. 15, E of East Rother Ridge.

Whitwell Hill, S of the Town, yellow Lime, No. 14, E of East Rother Ridge.

Wichnor Park, near Yoxall, Staffordshire, Red Marl, No. 28, W of West Churnet and Dove Ridge.

Wickenstones Rocks, 6 *m.* WNW of Leek, in Staffordshire,

fordshire, coarse Grit Rocks of the upper Coal series, No. 39, on Grand Ridge.

Wickersley Hill, S of the Town, Yorkshire, Grit, Grindstone Quarries, No. 31, on East Rother Ridge. •

Wild Bank, N of Mottram, Cheshire, 3rd Grit, No. 8, on North Ethrow Ridge.

Willesley Hill, E of the Town, Red Clay, No. 2, S of Ashby and Burton Ridge.

Willesley Wood, NW of the Town, No. 14, S of North Mease Ridge.

Windy Knowl, 1 *m.* W of Castleton, on the Road towards Chapel-en-le-Frith, 4th Lime, No. 4, on East Wye Ridge.

Wingerworth Park, near Chesterfield, 10th Grit, No. 44, E of East Derwent Ridge.

Win Hills, N E of Hope, 3 Hummocks of 1st Grit, on Shale and shale Grit, No. 4, on North Noe Ridge.

Winney Lane Hill, S of Harthill, Yorkshire, yellow Lime, and salmon-coloured Grit, the great fault thro' it, No. 16, E of East Rother Ridge.

Wirestone Hill, N W of Ashover, 2nd Grit, high, No. 2, on West Amber Ridge.

Withins Mouth, near Woodhead, between Yorkshire and Cheshire, Peat on 2nd Grit, No. 4, on Grand Ridge.

Wolfscote Hill, near Hartington, 4th Lime, No. 40, on West Derwent Ridge.

Wollaton Hall, S E of the Town, Notts, Gravel, on Coal Shale, No. 12, on East Erewash Ridge.

Wooden Box, near Hartshorn, between Derbyshire and Leicestershire, Red Clay, No. 16, on North Mease Ridge.

Wood Head, 1½ m. E S E of Taddington, 2nd Lime, No. 13, N of South Wye Ridge.

Woodthorp Hill, N of the Village, near Hansworth, Yorkshire, 11th Grit, No. 19, on West Rother Ridge.

Wymans Hill, in Aston, Red Marl and Gypsum, No. 101, W of West Derwent Ridge.

Yeldersley Wood, near Bradley, loamy quartz Gravel, on Coal-measures? No. 3, S of South Schoo Ridge.

Yew Tree Hill, S of Leek, Staffordshire, quartz Gravel, No. 9, W of East Churnet Ridge.

The extensive List of *Hills* given above[*], besides its uses in the Geography of the County and neighbouring districts, serves at the same time for marking and defining so many points in the stratification of the district, as I shall take occasion further to explain, when treating of the *Strata*, in Section IV. of this Chapter.

The Rocky parts of Derbyshire and its environs, furnish numerous instances of narrow *Valleys*, or Dales, with precipitous and rocky sides, often exhibiting very fine Rock Scenery, which, as objects of curiosity and interest to the Traveller, seem to require some notice in this place; and being able to mention the most striking particulars, relating to the stratification of each of such Valleys, the following list will, I hope, interest the Miner and the Geologist, as pointing out the best situations for examining and comparing the edges of corresponding strata, on the two sides of a valley, the ledges of Rock in its bottom, and of studying the truly surprising and powerful causes which have operated in the excavation of such Valleys; a subject which will be further elucidated, by the account of the beds of the different *Rivers*, in Section VI. of this Chapter.

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[*] This List in a different form, viz. arranged numerically in order, according to the several Ridges to which they belong, will be found in Mr. Tilloch's Philosophical and Geological Magazine, vol. 37, page 161, though without the references to the adjacent Towns, &c. here given.

An Alphabetical List of the Names of the principal narrow and Rocky VALLEYS, *or Defiles, with precipitous Cliffs, in and near to Derbyshire, describing their Situations, the* STRATA *exhibited in their Sides and Bottoms, and the Names of the most noted* ROCKS, CAVERNS, *&c. in each.*

Barbrook Dale, N E of Baslow, about ½ *m.* long, E of Derwent River, in a N E direction; Cliffs and loose blocks of 1st Grit Rock, a lead Cupola, slag-mill and Sulphur work in it.

Berrisford Dale, SSW of Hartington, between Derbyshire and Staffordshire, extending about ½ *m.* S along the course of Dove River, in 4th Lime; ruins of a Castle.

Bonsal Dale, S of the Town, extending nearly W 2 *m.* from Cromford Town to Griffe and Via Gellia Dales, with branches on the north up to the Town; 1st, 2nd, 3rd, and 4th Lime Rocks, and 1st, 2nd, and 3rd Toadstones, Tufa at Marygrot Spring, Hot Springs formerly: very deep and striking, with a good Turnpike Road through it, towards Buxton: it has two lead Cupolas and slag-mills, a Sulphur work, Calamine works, a Stone Saw-mill, &c. in it.

Bradford Dale, S and SW of Yolgrave, extending about SW 1¼ *m.* from Lathkil Dale; Shale, 1st Lime, and 1st Toadstone (in the River SW of Yolgrave),

grave), Slither, or indestrucitble and barren Lime-rubble on its sides; a prodigious large Spring at Middleton.

Bradwell Dale, S of the Village, extending thence S about ½ *m.* in 1st Lime, with black Chert nodules in very regular layers.

Brook-bottom Dale, N N W of Tideswell, extending about 1¼ *m.* from the Town, 2nd Lime, and 2nd Toadstone (in the Brook at its N W end); Black Marble of the 2nd Lime Rock, is dug here, an ebbing Well formerly; Road through it, towards Chapel-en-le-Frith.

Burbadge Dale, N N E of Nether Padley, extending N N E about ¼ *m.* in 1st Grit, with Grindstone Quarries.

Callenge Dale, S E of Monyash, a branch from Lathkil Dale S, 1st Lime, Slither.

Cave Dale, SW of Castleton, extending 1 *m.* from the Town, 3rd Lime, 3rd Toadstone, and 4th Lime at its W end; a very narrow entrance from the Town, columnar Toadstone.

Combs Dale, S of Stoney Middleton, extending from near Calver WSW about 1½ *m.*, deep, in 1st Lime, and Toadstone at High-field Sough-mouth.

Cressbrook Dale, S E of Litton, extending about 1½ *m.* N from the Wye at Monsal Dale; 1st Lime, and 1st Toadstone at N end; 2nd Lime, and 2nd Toadstone, and 3rd Lime at S end; Slither, Hobsthrust Rocks.

Cresswell Crags, E of Elmton, between Derbyshire and Nottinghamshire, extending E about ½ *m.* in a lifted part of the yellow Lime, small Caverns.

Cummins Dale, E of Buxton, extending from Dale-end Mill on the Wye about ¼ *m.* NW, 4th Lime, with a crystallized granular bed of Limestone on S side; a dry dale, owing to the Swallow-holes at Water-swallows above.

Deep Dale, N of Brierley-foot Toll-Bar, near Chelmerton, extending about ½ *m.* S S W from Marl Dale, 4th Lime.

Devil's Bowling-alley, N of Alderwasley, extending from the Derwent ⅓ *m.* S W, 1st Grit, with large loose blocks.

Dimins Dale, NW of Sheldon, extending from near the Wye River S W about 1¼ *m.*, 1st Lime at S W end, 1st Toadstone, and 2nd Lime.

Dove Dale, N N W of Thorpe, between Derbyshire and Staffordshire, extending northward near 5 *m.* along the course of the Dove, surprisingly deep in the 4th Lime, much Slither, but no loose blocks: the high and issolated Rocks in this grand dale are called, Dove-dale Church, Lover's-Leap, Pickerings, Sugar-Loaves, Tissington-Spires, Thorpe-cloud (at the S end), &c. Reynard's Hall, and Cave, and Dove-hole, are curious Caves; there is here also, a fine natural Arch at Reynard's Hall: many very wide and barren or dead Veins, cross this dale obliquely.

Dovehole Dale, N E of Fairfield, extending about 1½ *m.* N NW from Great-Rocks dale, in 4th Lime, a dry dale, owing to Swallow-holes at Dove-hole Cotton-mill.

Eyam Dale. See *Middleton Dale.*

Flag Dale, S W of Wormhill, extending about 1 *m.* NW from the Wye River at Chee Tor, in 4th Lime, with 3rd Toadstone along its N E border; large Springs at its S E end.

Grange-mill Dale. See *Griffe Dale.*

Grass Dale, N E of Wormhill, extending about 1 *m.*

NNW from Monks Dale to Hay Dale, 3rd Lime at S end, 3rd Toadstone, and 4th Lime at N end; a dry dale, owing to Swallow-holes in this and Hay Dale above.

Great Rocks Dale, W of Wormhill, extending 2¼ *m.* from the Wye NNW to Dovehole Dale, in 4th Lime, with sunk pieces of 3rd Toadstone in it? near the Buxton Road; a dry dale, owing to the Swallow-holes at Dove-hole Cotton-mill above.

Griffe Dale (or Grange-mill Dale), S of Grange Mill, extending thence southward about 1¼ *m.* to Via-Gellia and Bonsal Dales, in 4th Lime, 3rd Toadstone at its N end; a new Turnpike Road through it.

Hamps Dale, in Staffordshire, NNE of Caldon, extending about 2¼ *m.* SSW from Ilam and Wetton Dales at Beaston Tor, in 4th Lime. The channel of the Hamps River is here dry, when not swoln by great rains, and its waters, which fall into Swallow-holes at Waterfall and Waterhouses, pass more than 3 *m.* under ground to Hamps Spring! W of Ilam Hall.

Hay Dale, S of Peak Forest Town, extending about 1 *m.* N from Grass Dale, in 4th Lime; a dry dale, below the Swallow-holes near its N end.

Hay Dale, S of Wardlow, extending N about 1 *m.* from Monsal Dale, in 2nd Lime, with 1st Toadstone at its N end, and nearly along its eastern border; vast beds of Slither, or indestructible and barren Lime-rubble, on its E side.

Hipple Dale, W of Brassington, extending about ¼ *m.* NNE, with a branch E, in 4th Lime; a prodigious Spring breaks out at its S end, near the great Limestone Fault, about once in 20 years.

Ilam Dale, in Staffordshire, NW of the Town, extending skirt or border: much Slither, or indestructible and barren Lime-rubble is lodged on the sides of this valley; black Marble of the 2nd Lime is dug here, near Little Longsdon.

New-Mills Dale, S of the Village (in Glossop), between Derbyshire and Cheshire, extending about W ⅓ *m.* from the junction of New-Mills Brook with the Goyte River, in 3rd Grit and Coal Shale, called Tor Cliff. This is the most singular and striking Grit-stone Valley, which I have any where witnessed.

Plesley Forge Dale, E of the Town, between Derbyshire and Nottinghamshire, extending E about ½ *m.* in yellow Lime. Hobsthrust and other bold Rocks are here much admired; a large Cotton-mill occupies the scite of the ancient Iron Forge.

Ricklow Dale, E of Monyash, extending nearly N about ⅓ *m.* in 1st Lime; Entrochi Marble is here dug.

Sandy Dale, S S E of Wormhill, extending S SW about ¼ *m.* from Wye Dale to near Blackwell Village, in 3rd Lime, and 3rd Toadstone at its southern end : the 2nd Toadstone skirts its eastern border at the northern end, and produces numerous quartz Crystals, or Derbyshire Diamonds.

Sherbrook Dale, S E of Buxton, extending nearly SW about 1¼ *m.* from Wye and Mill Dales, in 4th Lime, and a patch of 3rd Toadstone, at the crossing of the Buxton and Ashburne Road, whence a private Coach-road proceeds thro' this dale eastward.

Small Dale, SW of Peak Forest Town, extending N E about ½ *m.* from Dovehole Dale, in 4th Lime, which on the sides of this dale assumes a columnar structure.

Thatch Dale, W of Wheston, near Tideswell, extending E about ⅓ *m.* from Grass Dale, 3rd Lime and 3rd Toadstone; 4th Lime on its N skirt.

Tideswell Dale, S of the Town, extending therefrom 1 *m.* to Millers Dale, in 3rd Lime, and 3rd Toadstone which is thrown up therein by a Fault: the 2nd Toadstone skirts along near its E border; Tufa is found in it, at its S end. It is often a dry Dale, owing to the Swallow-holes at the S end of Tideswell Town.

Via-Gellia Dale, N of Hopton, extending about ¼ *m.* S from Bonsal and Griffe Dales, in 4th Lime. The Hopton-wood Freestone Quarries are on the E side of this Dale, just below the 3rd Toadstone basset. Mr. Gell's private Road passes thro' this Valley.

Walley Furnace Dale, N of Over Langwith, extending about ¼ *m.* nearly N, in yellow Lime.

Wensley Dale, S of the Village, extending ½ *m.* E S E, in 1st Lime.

Wetton Dale, in Staffordshire, W of the Town, extending nearly N about 1½ *m.* from Hamps and Ilam Dales; deep in the 4th Lime. Thor's House Tor is a remarkable Rock with a natural Arch and Cave, by this Dale, which is dry in dry seasons, below Darfa Swallow-holes, which suddenly absorb this considerable River, after it has crossed the great Limestone Fault.

Winnets Dale, W of Castleton, extending about ½ *m.* W, in 4th Lime, deep and rugged; the Turnpike Road to Chapel-en-le-Frith goes up this steep and curious valley.

Wirksworth Dale, in N W end of the Town, extending NW about ⅓ *m.* in 3d Lime.

Woo Dale, E of Buxton, extending N about ¼ *m.* from Wye Dale, in 4th Lime.

Wye Dale*, E of Buxton, extends E about 4 *m.* from Mill and Sherbrook Dales to Miller's Dale, in 4th Lime, and rd Toadstone at its E end, the 3rd Lime there also skirting it on each side. Chee Tor, Peterson Pike, and Lover's Leap, are noted Rocks in this Dale, which has some Slither in it, particularly opposite to Chee Tor in Wormhill, where are two very large Springs of Water. The Duke of Devonshire has, I have been informed, a design of extending the private Road for the accommodation of Travellers, from Lover's Leap at the S E end of Mill Dale, thro' Wye Dale, Miller's Dale and Monsal Dale to Ashford, by which all the Hills between these places, and indeed all those between Buxton and Matlock nearly, would be avoided, besides laying open the fine Rock scenery on the Banks of the Wye River, which has hitherto been but little seen, owing to the great difficulty of access to it.

I have selected the above, as specimens of the narrow and precipitous Valleys of Derbyshire and its environs: the neighbourhoods of Ballidon, Brassington-pastures, Brushfield, Dowall, Flagg, Hartington, Pike-Hall and others, present similar Dales, some of considerable length, and not less striking than many of the above, and which I have visited, but don't happen to have learnt their particular Names; otherwise they would have been included, on account of the facility which such Lists give, of recording a number of highly curious and interesting phenomena, of which Travellers may in future avail themselves: it is to such Valleys also, that Mineralogists and Geologists must principally resort, to become acquainted with the different Calcareous and Basaltic Rocks of this County, to draw materials for the Natural History of each, and for settling the important and contested questions, respecting the origin, and mode in which Valleys were excavated and formed.

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* Sometimes the term *Wye Dale* is used, to designate the entire Limestone Valley from Buxton to Bakewell, in which sense, it includes Mill Dale, Miller's Dale, Monsal Dale, &c.

It must not be inferred, that high and precipitous Rocks and Cliffs are peculiar to or confined to the class of Valleys of which I have been speaking, since the sides of the wide Valleys, also, abound with Rocks and Cliffs, some of them highly picturesque and beautiful, but such Rocks seldom continue far, without the intervention of grassy or cultivated slopes, such as the sides of Valleys usually present, in districts where no durable or permanent Rocks exist in their strata: whereas, in the narrow Valleys above, such slopes, or interruptions to the continuity of the Cliffs on each of their sides, are rare, and in some instances do not occur at all, within the distances which I have named. The Grit-stone Rocks of this district, seem particularly disposed to appear and disappear repeatedly on the surface at their edges, or in tracing their Bassets through the country; and except of the 1st or lowest Grit Rock, it is a rare thing to find a continued Grit-stone Cliff of any length: some of them, indeed, are so disposed to moulder and fall, on exposure to the air, rain, frost, &c. that Cliffs of such Rocks are never seen; but where *Slips* or slidings have happened, in comparatively modern times, of which there are numerous and striking examples in Derbyshire, particularly in the Shale and shale Grit districts; and as it seems of the utmost importance in Geological researches, to distinguish between Cliffs or Facades of equal antiquity with the valleys themselves, probably, or such as have originated with, or been increased by, subsequent and sudden Slips[*], or by the gradual and recent undermining of currents of the Brooks and Rivers, I shall here give a

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[*] Since the above was written, I have read with some surprize, pages 61 and 62 of the recent Translation of M. Werner's "New Theory," on the subject of Mineral Veins, wherein the phenomenon of Slips, as above, is described, and it is gravely maintained, that such, happening "in rainy seasons," have *opened* the fissures for Mineral Veins (to be afterwards filled, I suppose); as though the conchoidal fracture of a Slip from an adjoining Hill, close pressed and ground by the moving load of softened Earth, had any relation to a rake Vein! This is not however solely relied on for the opening of Veins; but we are informed (p. 48), that while the beds of the Mountains were "at first wet, and possessed little solidity," the mass "yielded to its weight," "sunk and cracked," "falling to the *free* side;" now, notwithstanding the parade of mathematical definitions and preparations, at pages 88 and 89, I would venture to ask any one who knows Derbyshire, and the large rake Veins which cross the comparatively flat districts, that lay between Bradwell and Tideswell or Wardlow, between Sheldon and Monyash, between Winster and Bonsal, &c. which is the *free side* in any of these cases? or what sort of an action of *their own weight* it must have been, which caused such immense lumps of Limestone to start a few feet asunder, in so many instances, quite down to the Toadstone (and again under it, as some would remind them)? It is just hinted to us, it is true (p. 50), that "the shrinking of the mass of a Mountain, *produced by desiccation*, and *still more by Earthquakes*, and other similar causes, may also have contributed to the formation of rents," for Veins. As a comment upon all this, the learned Translator tells us, truly, I believe, (p. 256) that "the *widest Veins* generally occur in the most horizontal strata." Since the above, Dr. James Millar, in his Appendix to Williams's Mineral Kingdom, professing to give a view of the "Theory of Werner," omits all notice of the opening of Mineral Veins by Slips, Pressure, Earthquakes, &c. as above, and merely says, that they happened, according to this Theory, "by the *drying* and shrinking of the newly formed strata."—Perhaps the Doctor chose this course, out of tenderness to the author of the Theory.

List of such S*LIPS*, *or modern sliding and sinking of tracts of ground on the sides of Hills*, as I have noted in the course of my Survey, viz.

Alpert, in Hope Woodlands (Castles).
Atlow W, Win House S E, recent.
Bakewell, S of the Town; and E (Edge).
Bramcote E, Staffordshire (Black-Meer of Moredge).
Bretton N E, in Eyam (clough).
Calver S, in Back Dale (North Cliff).
Castleton NW (Mam-Tor Hill S side, large).
Charlesworth, in Glossop, N E (Hargate Hill), and S E (Combs Rocks), in 2nd Coal Shale.
Darley N (Stone Cliff): and S (Oaker Hill).
Darwent Chapel S E (Shuts ding Bank, and Lady-bower): N (Hag-hole): and N NW (Ronksley), at
Edale, in Castleton (Mam-Tor Hill N W and N E sides), very large: (Back Tor, of Loose Hill W end); and Lee Farm.
Great Hucklow N (Bur-Tor).
Haddon Park W, in Bakewell.
Hathersage E, N of the Cupola.
Lea, near Matlock, SW (Woodseats): and (White Tor).
Ludworth, in Glossop, N E (Stirrup Benches), in 2nd Coal Shale.
North Anston, Yorkshire, N (Clarkes Stones) in yellow Lime, &c.
Rowlee, in Hope Woodlands, N, very large.
Stannington, near Sheffield, Yorkshire (Little-Matlock Cliffs), in 1st Coal Shale.
Stanton Leys, near Darley, N (S Moor).
Starkholmes, in Matlock.
Tor-side, in Glossop, near Woodhead.

Upper Ashop, in Hope Woodlands, N W (Combs-Tor), very large; (Dine-Sitch Tor): and N (Collet Hay).
Wensley, near Winster, N.
Willersley, in Matlock, N E.
Wirksworth, N W (Bole-Hill).
Woodhead, Cheshire, S E.
Woodseats-Hall, in Barlow, ½ *m.* SW, in 2nd Coal Shale.

All the above Slips, except five, which are mentioned, and numerous other smaller ones, are occasioned by the Limestone Shale; sometimes the sunk pieces contain part of the 1st Grit Rock on the Shale, or large pieces of shale Grit, or shale Limestone, perhaps, in their masses.

As in the judgment of some I shall be thought, probably, to have said too much already on the form and surface of the County, I shall now close this Section by mentioning, that Derbyshire contains about 972 square English miles, or 622,080 statute acres*.

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* Which is the result of a careful scaleing of my large Map. In the Original Report, Mr. Thomas Brown stated the quantity at 720,640 acres; the Parliamentary Returns of the Poor's Rates, as stated by Mr. Thomas Poole, make Derbyshire contain 689,280 acres, which last, considering that many of the Parish quantities must have been stated by estimation, agrees sufficiently near with mine above. About the year 1756, when Benjamin Martin published his Natural History of England, this County was stated to contain only 540,800 acres; but a Dictionary of Arts and Sciences now publishing in London, magnifies its dimensions to 1,600,000 acres! See other particulars of the acres in this County, in Sections IV. and VI. of this Chapter.

SECT.

SECT. II.—DIVISIONS.

The County of Derby is divided into six *Hundreds*, exclusive of the Borough of Derby, viz. Appletree, Borough of Derby, High Peak, Morleston and Litchurch, Repton and Gresley, Scarsdale, and Wirksworth Wapentake (or the Low Peak). These are subdivided into *Parishes*, and *Townships* or *Hamlets*; the former, as well as the latter, being very unequal in size; some Parishes in the northern parts of the County being very large and extensive, while towards the south, Parishes as small as in most Counties in England are to be met with. In recording the numerous observations which I have had to make, it has been found necessary, for greater precision as to the localities of facts, often to subdivide the larger Parishes, into smaller divisions, than the Townships or Hamlets above mentioned; *Villages* are perhaps an improper term for these in some instances, but a better general name for them does not readily present itself. In many of the larger Parishes, these Villages are very numerous, and generally appear to a Traveller as distinct, and are sometimes as far removed from each other, as the Towns and Churches are, in some other districts of the County. I shall therefore here give an alphabetical List of these *Villages* and noted places in each *Parish*, arranged in like order in the seven several *Hundreds*, &c. as above, viz.

Appletree Hundred.

Parishes.	*Villages, &c.*
part of Ashburne	Hulland
	Hulland Gate
	Hulland Lane
	Penters Lane
	Sturston
	Ward Gate (in Hulland)
	Yeldersley
part of Barrow (on Trent)	Arleston
	Stenston
	Synfin
	Twyford
Barton-Blount	
Boylstone	———
	Hare Hill
part of Bradburne	Atlow
Bradley	
Brailsford	———
	Burrows
	Culland
	Ednaston
	Ormaston
Bredsall	
Church-Broughton	———
	Sapperton
Cubley	———
	Cubley Moor
	Marston-Montgomery
	Stidd Hall
	Stone-dales
	Waldley
Dalbury	———
	Dalbury Lees
Doveridge	———
	West Broughton
Duffield	———
	part of Bar-gate
	Belper-gutter
	Belper Lane-end
	Belper Town
	part of Bull-bridge
	Burley
	Chevin-side
	Cow-house Lane
	Cow-way
	part of Coxbench
	Cross o' th' Hands
	Dey-park
	Duffield Bank
	Farlow-green
	Farnah
	Hazlewood-hall
	Hazlewood-lane
	Heage
	part of Hill-cliff Lane
	Holbrook
	Hopping-hill
	Makeney
	Milford
	Morley-park
	Nether-end (of Heage)
	Postern Lodge
	Ridge-way
	Shottle
	Shottle-gate
	Toad-moor
	Turnditch
	Wallstone
	White-moor
	Windley

Apple-

Appletree Hundred, continued.

Parishes.	*Villages, &c.*
Edlaston	———
	Wyaston
Etwall	———
	Barrowcote
	Burnaston
Hulland Ward	——— (extra parochial)
	Intake
	Mansel-park
Kedleston	———
	Little Ireton
part of Kirk-Hallam	Mapperley
	Park Hall
Longford	———
	Alkmanton
	Bentley
	Hollington
	Rodsley
	Upper Thurvaston
Marston (on Dove)	———
	Hatton
	Hilton
	Hoon
part of Mugginton	———
	Bullhurst
	Clivs
	Mercaston
	Ravensdale Park
Norbury	———
	Birchwood
	Birchwood-moor
	Darley-moor
	Roston
	Snelston
Radburne	
Scropton	———
	Foston
Shirley	———
	Yeveley
Somersall-Herbert	———
	Hill-Somersall
	Potters-Somersall
Spondon	———
	part of Burrowash
	Chaddesden
	part of Dumshill
	Locko-Park
	Stanley
Sudbury	———
	Aston
Sutton (on the Hill)	———
	Ash
	Cropo-top
	Long Lane
	Nether Thurvaston
	Osleston
Trusley	———
	Grange-field
	Nuns-field
part of Wirksworth	Alderwasley
	Alton
	Ashley-hay
	Biggin-mill
	part of Hillcliff Lane
	Iderich-hay
	Miln-hay
	Millington-green
	Nether Biggin
	Over Biggin
	Spout

Borough of Derby.

Parishes.	*Villages, &c.*
part of St. Alkmund	
Allsaints	
part of St. Michael	
part of St. Peter	
part of St. Werburgh	

High Peak Hundred.

Bakewell	———
	part of Alport
	Ashford
	Baslow
	Beeley
	Blackwell
	Brushfield
	Bubnell
	part of Buxton
	Calton
	Calver
	Chatsworth
	Chelmerton
	Clod-hall Farm
	Cowdale
	Curbar
	Flagg
	Froggatt
	Great Longsdon
	Great Rowsley
	Haddon Hall
	Hartle
	Harwood Grange
	Hassop
	Holme
	Kings Sterndale
	Little Longsdon
	Monsal-dale
	Monyash
	One-Ash
Bakewell (continued)	Over Haddon
	Ox-close
	Priestcliff
	Robin-hood (Baslow Colliery)
	Rowland
	Shacklow
	Sheldon
	Sherbrook
	Staden
	Taddington
	part of Wardlow
Castleton	———
	Barber Booth
	Grinds-brook (Edale Chapel)
	Nether Booth (Lady Booth)
	Oler Brook
	Over Booth
	part of Pindale
Chapel-en-le-Frith (or Bowden-chapel)	———
	Bank-hall
	Barmoor-clough
	Bowden-head
	Bradshaw-Edge
	Chapel-Milltown
	Eccles
	Ford
	Malcalf

High

High Peak Hundred, continued.

Parishes.	*Villages, &c.*
Chapel-en-le Frith (continued)	Olerenshaw
	Pichard-green
	Sitting-low
	Slack-hall
	Tunstead-milltown
	White-hough
part of Darley (in the Dale)	—
	part of Bridge-town
	Darley-flash
	Farley
	Hackney Lane
	Little Rowsley
	Northwood
	Over Hackney
	Stoncliff
	Tinkersley
	Toad-hole
Edensor	—
	Pilsley
Eyam	—
	Bretton
	part of Grindleford-bridge
	Hazleford
	Leam
	part of Stoney-Middleton
Glossop	—
	Beard
	Brown-side
	Bugsworth
	Car-meadow
	Charlesworth
	Chinley
	Chisworth
	Chunall
	Cobden-edge
	Dinting

Parishes.	*Villages, &c.*
Glossop (continued)	Gamesley
	Hadfield
	Hayfield
	Kinder
	Little Hayfield
	Ludworth
	part of Marple-bridge
	Mellor
	New Mills
	Ollerset
	Padfield
	Phoside
	Raworth
	Simondley
	Thornsett
	Tor-side
	Whitfield
	Whittle
Hathersage	—
	Bamford
	Barmoor
	Booth
	Brookfield
	Calow-mill
	Darwent-chapel
	part of Derwent-dale
	Gate-house
	part of Grindleford-bridge
	Malham-bridge
	Moscar-house
	Nether Padley
	Perry-Foot
	Rushop
	Sparrow-pit
	part of Stoney-Middleton
	Upper Padley

High Peak Hundred, continued.

Parishes.	*Villages, &c.*
Hope	———
	Abney
	Abney-grange
	Alport
	Ashop-dale
	Aston
	Bradwell
	Brough
	part of Buxton
	Callow
	Combes-edge
	Coplow-dale
	Cowlow
	part of Derwent-dale
	Dove-hole
	Eccles
	Fairfield
	Ferneylee
	Goldcliff (or Goldy)
	part of Goyte-bridge
	Great Hucklow
	Grindlow
	Hazlebadge
	High-low
	Horridge-end
	Little Hucklow
	Offerton
	part of Pindale
	Rowlee
	Shallcross
	Shatton
	Small-dale

Parishes.	*Villages, &c.*
Hope (continued)	Stoke
	Thornhill
	part of Wardlow
	part of Whaley-bridge
	West-end
	Windmill-houses
Peak Forest (Extra-parochial)	———
	Small-dale
Tideswell	———
	Cressbrook
	Dale-head
	Great-rocks
	Hargate-wall
	Litton
	Meadow
	Milnhouse-dale
	Tunstead
	Wheston
	Wormhill
part of Yolgrave	———
	part of Alport
	Birchover
	Callenge-low
	Conksbury
	Eaglestor (Ecclestor)
	Gratton
	Meadow-place
	Pilhough
	Stanton (in the Peak)
	Stanton-lees
	Winster

Morleston and Litchurch Hundred.

Parishes.	*Villages, &c.*
part of St. Alkmund	Darley-Abbey
	Little Chester
	Little Eaton
	Quarndon
	Wind's-arse
Allestry	

Parishes.	*Villages, &c.*
part of Ashburne	Clifton
	Compton
Aston (upon Trent)	———
	Great-Wilne
	Shardlow

Morleston

Morleston and Litchurch Hundred, continued.

Parishes.	*Villages, &c.*
part of Barrow (upon Trent)	——
part of Crich	——
	part of Bull-bridge
	Coddington
	Crich-chase
	Dark-lane
	Edge-moor
	Fritchley
	part of Holloways (nether and upper)
	part of Park Lane-head
	Plaistow-green
	Wakebridge
	Watstanwell-bridge
	Wheatcroft
Dale-Abbey (Extra-parochial)	——
	Dale-moor
	part of Dumshill
Denby	——
	Breach
	Heamore
	part of Openwood-gate
	Smithy-houses
Eggington	——
	Hargate-manour
Elvaston	——
	Ambaston
	Thurlston
Heanor	——
	Aldercar
	Codnor
	Codnor-park
	part of Golden-valley
	Heanor-wood
Heanor (continued)	Langley
	part of Langley-mill
	Loscoe
	Miln-hay
	Shipley
	Tag-hill
Horsley	——
	part of Bar-gate
	Cinder-hill
	part of Coxbench
	Horsley-Woodhouse
	Kilburne
	part of Openwood-gate
	Stanesby
	Upper Killis
Ilkeston	——
	Cotman-hay
	Little Hallam
part of Kirk-Hallam	——
Langley (Kirk)	——
	Meynel-Langley
Mackworth	——
	Markeaton
part of St. Michael	Alvaston
Mickleover	——
	Boulton
	Findern
	Littleover
Morley	——
	Smalley
part of Muggington	Weston-Underwood
Ockbrook	——
	part of Burrowash
	part of Dumshill
	Shackle-cross

Morleston and Litchurch Hundred, continued.

Parishes.	*Villages, &c.*
Pentrich	———
	Butterley
	Greenwich
	Harts-hay
	Padley-hall
	Pentrich-lane
	Ripley
part of St. Peter	Litchurch
Sandiacre	
Sawley	———
	Breaston

Parishes.	*Villages, &c.*
Sawley (continued)	Draycot
	Hopwell-hall
	Little-Wilne
	Long-Eaton
	Risley
	Wilsthorpe
Stanton (by dale)	
West-Hallam	———
	Lewcote-gate
Weston (on Trent)	
Willington	

Repton and Gresley Hundred.

part of Appleby	
part of Burton (South of Trent-Bridge)	Winshill
Calke	
part of Castle-Donnington	Derby Hills
Chellaston	
Church Gresley	———
	Castle-Gresley
	part of Donisthorpe
	Drakelow
	Linton
	part of Oakthorpe
	Swadlingcote
part of Clifton-Campville	Chilcote
Croxall	———
	Catton
	part of Edingale
Foremarke	———
	Ingleby
Hartshorn	———
	part of Butt-houses
	Midway-houses
	part of Wooden-box

part of Heather	
Lullington	———
	Coton (in the Elms)
Measham	———
	part of Donisthorpe
	part of Oakthorpe
Melborne	———
	Kings-Newton
	Wood-houses
part of Nether Seal	part of Donisthorpe
	part of Oakthorpe
Newton-Solney	
part of Packington	
part of St. Peter	Normanton (juxta Derby)
	Sunny-hill Lane
part of Ravenstone	
Repton	———
	Bretby (or Bradby)
	Bretby-common
	part of Cadhouse Lane
	Milton
	part of Ticknall (at E end)
	White-Hollows

Repton and Gresley Hundred, continued.

Parishes.	*Villages, &c.*
Smithsby	————
	part of Pistern-Nook
Stanton (by Bridge)	
Stapenhill	————
	Brislingcote
	Caldwell
	Newhall
	Stanton Ward
part of Stretton (in the Fields)	
Swarkestone	
Ticknall	————
	part of Cadhouse Lane
Walton (on Trent)	————
	Burrow-hill
	Rosleston
part of St. Werburgh	Osmaston
Willesley	————
	part of Packington

Scarsdale Hundred.

Alfreton	————
	Cotes Park
	part of Golden Valley
	Green-hill Lane
	Nether-Birchwood
	Over-Birchwood
	Outseats
	Pye-bridge
	Riddings
	Somercotes
	Swanwick
Alt-Hucknal (or Hault-Hucknal)	————
	Astwith (or Astwood)
	Bramley-lane
	Hardwick-hall
	Harstoft
	Rowthorn
	Sena
	Stainsby
part of Ashover	————
	Alton
	Birkin-lane
	Brockhurst
part of Ashover (continued)	Butterley
	Doway-hole Lane
	Hay-side
	High-Ashes
	High-Oredish
	Kelstedge
	Little-moor
	Marsh-green
	Mill-town
	North-edge
	Overton
	Prass
	Robriddin
	Slack
	Spitewinter
	part of Stanage
	Stubbing-edge
	Upper-Town
Barlborough	
Beighton	————
	Berley
	Hackenthorp
Blackwell	————
	Hillcote
	Newton

Scarsdale Hundred, continued.

Parishes.	*Villages, &c.*
Bolsover	———
	Glapwell
	Oxcroft
	Shuttlewood
	Stanfrey
	Walley
Chesterfield	———
	Ash-gate
	Birley
	Boythorp
	Brampton
	Brimmington
	Calow
	Cutthorpe
	Dunston
	Grass-moor
	Hady
	Hall-cliff
	Hasland
	Holy-moor-side
	Loads
	Moor-hay
	Newbold
	New Brampton (or Little Brampton)
	Platt-hall
	part of Stanage
	Stubbing
	Sumersall
	Swathwick
	Tapton
	Wadshelf
	Walton
	Wigley
	Wildens Mill
	Wingerworth
Clown	
part of Crich	Lindow-lane
	Wessington
Dronfield	———
	Apperknowl
	Bank
	Barber-fields
	Bents
	Birchett
	Cartlidge
	Cole-Aston
	Cowley
	Dore
	Hill-top
	Holmsfield
	Horsley-gate
	Hundall (or Undall
	Lower Birchett
	Lydgate
	Millthorpe
	Queston (or Unston
	Stubley
	Summerley
	Totley
	Unthank
	Woodhouse
Duckmanton (Long) (cum Sutton,)	———
	Adelphi
	Far-Duckmanton
	Middle-Duckmanton
Eckington	———
	Bole-hill
	Bramley
	Ford
	Gander-lane
	Geer-lane
	High-lane
	Killamarsh
	Marsh-lane
	Moor-hole
	Mossborough

Scarsdal

Scarsdale Hundred, continued.

Parishes.	*Villages, &c.*
Eckington (continued)	Mossborough-moor
	Overthorp
	Renishaw
	Ridgeway
	Slode-lane
	Spinkhill
	Temple Normanton
	Troway
	White-lane
Elmton	———
	part of Cresswell
Heath	
Morton	———
	Brackenfield
	Ogstone
	Trinity-chapel
	part of Wooley-moor
North-Winfield	———
	Ainmoor
	Ankerbold
	Clay-cross
	Danes-moor
	Deer-leap
	Ford
	Hanley
	Henmore
	Holm-gate
	Loco-lane
	Newmarket
	Pilsley
	Smithy-moor
	part of Stretton
	Tupton
	Williamsthorpe
	Woodhouse
	part of Wooley-moor
Norton	———
	Abbey-dale
	Beauchief
Norton (continued)	Bole-hill
	Bradway
	Green-hill
	Heely-mill
	Hempyard-lane
	Hemsworth
	Lightwood
	Little Norton
	Norton-leys
	Oaks
	Woodseats
Over-Langwith	
Pinxton	———
	Carter-lane
Plesley	———
	Shirebrook
	Stoney-Houghton
Scarcliff	———
	Langwith-lane
	Palterton
	Riley
Shirland	———
	Hales-green
	Hall-field Gate
	Higham
	part of Stretton
	Toad-hole Furnace
South Normanton	
South-Winfield	———
	Four lane-ends
	Oakerthorpe
	part of Park lane-head
Staveley	———
	Barlow
	Barlow Bole-hill
	Brentwood Gate
	Far Lane
	High-Ash
	Hollinwood-common
	Inkersall

Scarsdale Hundred, continued.

Parishes.	*Villages, &c.*
Stavely (continued)	Inkersall-green
	Middle Handley
	Mill-close Lane
	Moor-hall
	Nether Handley
	Netherthorp
	Norbrigs
	West Handley
	Woodseats-hall
	Woodthorp
Sutton (in the dale) (cum Duckmanton)	———

Parishes.	*Villages, &c.*
Tibshelf	———
	Biggin
Whitwell	———
	Belph
	Cinder
	part of Cresswell
	Steetley
	Walls
Whittington	———
	Glass-house Common
	part of Sheep-bridge

Wirksworth Wapentake (or Low Peak).

part of Ashburne	———
	Alsop
	Bradley-Ash
	Cold-Eaton
	Hognaston
	Newton-grange
	Offcote
	Parwich
	Sandy-brook
	Underwood
part of Ashover	Dethick
	part of Holloways
	Lea
	Lea-wood
Bonsal	——— (nether Town)
	Bright-gate
	Slaley
	Upper-Town
part of Bradburne	———
	Aldwark
	Aldwark-grange
	Ballidon
	Brassington

part of Bradburne (continued)	part of Griffe
	Lea-hall
	Nether Bradburne
	Pike-hall
Carsington	
part of Crich	Tansley
part of Darley (in the Dale)	part of Bridge-town
	Cowley
	Cross Green
	Oaker-end
	Snitterton
	Wensley
Fenny-Bentley	
Hartington	———
	Biggin
	Brand
	part of Buxton
	Church Sterndale
	Cronkstone
	Crowdycote
	Dowall
	Foxlow
	Glutton
	part of Goyte-bridge

Wirksworth

Wirksworth Wapentake, continued.

Parishes.	*Villages, &c.*
Hartington (continued)	Grindon
	Harley
	Hasling-house
	Heathcote
	High Needham
	High-street
	Hurdlow
	Ludwell
	part of Moss-houses
	New Haven
	Pilsbury
	Wheeldon Trees
	Wolfscote
Kirk Ireton	———
	Blackwall
	Ireton-wood
Kniveton	———
	Agnes-meadow
Mappleton	
Matlock	———
	Allen-hill
	part of Cromford (Scarthen Nick)
	Harston
	Lumsdale
	Matlock Bank
	Matlock Baths

Parishes.	*Villages, &c.*
Matlock (continued)	Matlock Bridge
	Riber
	Starkholmes
	Willersley (Cromford-bridge)
Thorpe	———
	Hanson-grange
Tissington	
part of Wirksworth	———
	Bole-hill
	Brayfield
	Callow
	part of Cromford
	Gorsey-bank
	Grange-mill (Ivenbrook Grange)
	part of Griffe
	Hopton
	Ible
	Middleton
	Miller's-green
	Wigwell
part of Yolgrave	Elton
	Middleton
	Smerril-grange

The line which is drawn after the Parish's Name in general, signifies the Town or chief place of such Parish, in distinction from the Villages, &c. therein, which follow*. Where "part of," is prefixed to a parish's name, it either implies that some parts of that parish is in a different Hundred, or that some parts thereof are in another *County;* among the first class of

these,

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* The utility of this List of the *Villages* in the County, referred each to its proper Parish and Hundred, appears to be such, that I have prepared an alphabetical arrangement of them, which I intend to give at the end of the Preface to the second volume.

manton from Eckington, parts of Repton and of Castle Donnington, at the E end of Ticknall Town.

The *Villages*, &c. in the second column of the above Table, being entirely local, owe their separation into different Hundreds or Parishes, to the boundary passing thro' a part of them, where "part of" is found prefixed to the Name.

Before dismissing this subject, I ought particularly to acknowledge the great and very kind assistance which I have received in marking these divisions, from Mr. Wolley, of Matlock Bath, as well as on several other subjects connected with my enquiries.

Derbyshire contains at present 11 *Market Towns*, of which two are of recent establishment, while the Markets formerly held in three other places have been discontinued; but the more appropriate place for the further details on this subject, will be in Sect. 5, of Chap. XVI.

The County contained in 1801 about 33,191 Houses, occupied by 161,142 persons: but more on this subject, must be reserved for Sect. 11 of Chap. XVI.

The *Assizes*, and three of the *Quarter Sessions*, are held at Derby, the County Town, the Midsummer Sessions being held at Chesterfield*. The Town of Derby returns two Members to Parliament, and two others are returned by the Freeholders of the County; which four Members are greatly inferior to the fair proportion, which the wealth, manufacturing importance and population of this fine County, ought to return to the National Representation.

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* Until about the year 1797, only two of the Quarter Sessions were held at Derby, the Michaelmas Sessions being then held at Chesterfield, and the Midsummer Sessions at Bakewell; but the former was then removed to Derby, and the latter from Bakewell to Chesterfield.

The Commission of the Peace in this County is very ably and respectably filled, by the Gentlemen of great property in it: the Duke of Devonshire, who has long been the Lord Lieutenant of the County, has always and very properly considered, that the spiritual concerns of the Clergy, are sufficient to occupy all their attention, and has in no instance placed such on the Commission: a practice which I find attended with such happy and beneficial effects, that I cannot in this place avoid recommending its more general adoption. In proportion as every Session of Parliament, almost, adds so considerably to the active duties of a Country Justice, it must become increasingly improper, to invest Clergymen with this Office.

Ecclesiastical Divisions.—Derbyshire is in the Diocese of Lichfield and Coventry: it is subdivided into six Deaneries, and these again into Parishes, the particulars of which are given in Mr. Pilkington's "View of Derbyshire," vol. ii.; an abstract of which was also given by Mr. Thomas Brown at the end of the original Report, to which I beg to refer, after mentioning, from the latter source, the Names of the several Deaneries and number of Parishes in each, viz. Ashburne 16 parishes, Chesterfield 28, Castillar 18, High Peak* 11, Derby 38, and Repington† 20 parishes.

Bakewell, Calke, Dale-Abbey, Hartington and Peak-Forest, are places which have peculiar Jurisdiction in Ecclesiastical matters.

In the parts of the County where the large Parishes are situate, the number of Dissenting and Methodist Meeting Houses seem very numerous, and are appropriated to most, if not all, of the prevailing Religious Sects, even the emissaries of Johanna Southcote have obtained a footing in Ashover. The Chapels of the Methodists seem the most rapidly increasing, in the manufacturing districts, of this and the adjoining Counties. At the time when the very large districts which I have alluded to were laid out as single Parishes, it is to be presumed, that the population was very low, and most of the land unproductive commons and moors, the value of the livings being then proportionally small, but since so large a portion of the lands have been brought under productive cultivation, and populous Villages of Manufacturers have arisen, far exceeding many of the smaller parishes in their number of Inhabitants, and far removed from the Church or any of the Chapels of Ease, belonging to the over-grown Parish to which they belong, a division of such Parishes has certainly been wanted, as well as larger and more commodious Buildings than the Chapels of Ease are, in numerous instances: to the erection of which, the increased value of the Tithes as well as of the Lands, ought perhaps to have contributed. It has been the opinion of several intelligent Gentlemen of such districts, with whom I have conversed, tho' far from being favourers of Dissenters from the National Church, that the morals of the lower class among them, would have suffered very materially, from this cause, but for the exertions of the Dissenting and Methodist Preachers among them, and have related to me several instances, of visible improvements in the sobriety and orderly conduct of their Labourers in general, since the Chapels, which every where meet the eye of the Traveller in such districts, were erected.

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* Called by mistake Derby Archdeaconry in the original Report.

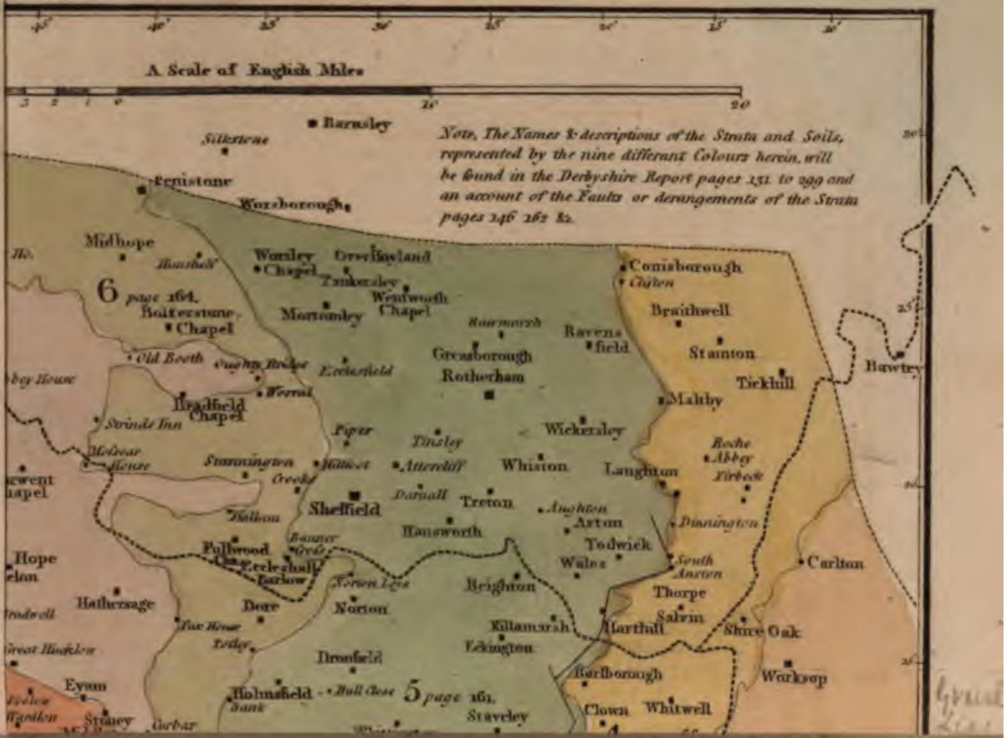
† Not Rippington.

SECT. III.—CLIMATE.

A DISPOSITION to the marvellous, seems to me to have pervaded all the accounts of the Climate and Surface of Derbyshire which I have read; there is certainly a sensible difference between the Climate of some of the middle and north-westerly parts of the County and the remainder of it, owing to their difference of elevation; but this is far from being so great or striking, that cultivation in most instances, and successful improvements in every instance, cannot be practised, as I shall take occasion further to explain in the Twelfth Chapter.

The name *High Peak*, seems almost generally misunderstood by strangers to Derbyshire, and even by a large portion of the Inhabitants of the Southern part of the County itself; the greater number understanding thereby, a certain alpine and inhospitable region; while others have imagined *the High Peak*, to refer to some frightful Mountain or Precipice, which, like that of Tenerif, lorded it over all the surrounding Country, instead of its being the Name of one of the Hundreds of the County, including a large portion of its population and industry, as the details which I shall have to submit in this Report will shew, and which, though it includes a large share of the high and yet uncultivated Lands, or Moors as they are here called, of the County, does not embrace the whole of such, since the Parish of Hartington, extending 14 *m.* of direct distance (from near Cold-Eaton to Goyte-bridge), lying wholly in the elevated tract, including Axe-Edge Hills, and numerous other very high ones, is entirely in the Wapentake of Wirksworth, or the *Low Peak*, as it is more commonly called. In my long sojournments in the Peak Hundreds, I saw or heard of none of those "violent storms" and ravages committed on the lands "by torrents of Rain," which are mentioned in some, even of the most recent descriptions of this County; the showers and winds here, seemed to me perfectly similar to what I had ever experienced in other places, the former occurring more frequently in some places, than in others differently situated. Buxton, and other places situated in the first wide Vale, or Bay between Hills, on the East side of the Grand Ridge, seemed to be visited by an unusual number of showers, particularly in July; the Snows begin occasionally to fall earlier in the Autumn, and continue later in the Spring, by perhaps 10 days or a fortnight in each instance, than they usually do in the very southern part of the County; and certainly the general Temperature is something lower in the Peaks, than it is in the other Hundreds of the County, Repton and Gresley in particular; but not in that striking degree which some have represented. I lament that I was unable to meet with any registers of Thermometers, whence this point might have been more accurately settled. At New Haven in Hartington, I was informed by Mr. T. Greenwood, that the Harvest with them, both for Hay and Corn, is a fortnight later on the average, than it is about Derby.

Frequent mention has been made, of Corn remaining out in the Fields of the High Peak at Christmas, indeed I saw myself, Oats standing in the Shock, and covered by Snow, on the 25th of November, 1808, between Buxton and Hartington; but it occurred to me, from the great number of Fields which had long been cleared in similar situations, that it must have been the effect of neglect and mismanagement on the part of the Farmer;



Note, The Names & descriptions of the Strata and Soils, represented by the nine differant Colours herein, will be found in the Derbyshire Report pages 131 to 299 and an account of the Faults or derangements of the Strata pages 246 262 &c.

d such was the opinion, on this and every similar in- ance, which became the subject of remark, in the many quiries which I made on this subject, except in par- ularly late and wet Seasons, like that of 1799, when orn here is much damaged, as indeed it is in more ured situations.

It was remarked to me at Ashover, that early and vere Autumnal Frosts seldom are the forerunners of a vere Winter—that Frosts after much wet seldom con- nue long—that with the Wind at S or SW, it very ten rains when the Sun gets into those quarters, at ive to three o'clock. Some expressed an opinion, at the weather for some time after the 4th and 5th ays of the Moon, often is similar to what happens on days; and about Harvest 1809, I found numbers Farmers consulting with great eagerness a printed able, falsely ascribed to Dr. Herschel, for foretelling e weather, by what happens to occur at the time of ew Moon.

Although I met with no constant or daily Registers the heights of the Mercury in the Barometer, during y excursions in Derbyshire, yet there are very few armers indeed, who are not now furnished with this eful instrument, and who do not often carefully ob- rve its state as to rising or falling, and whether above below the point of "changeable;" which, in moun- inous countries, rarely agrees with the graduated ate affixed by the maker, owing to the absolute height the place where it is to be used, differing materially om that where it was made and adjusted, and perhaps so to other causes; so that it is the safest way to ascer- in this experimentally, by noting the elevation of the ercury whenever the weather changes from wet to dry, vice-versa. Mr. John Milnes, of Ashover, has taken much pains in adjusting his changeable point, and in assisting his friends in different situations to do the same for their own Barometers: from this Gentleman I learned, that the highest states of the Mercury observed by him at the Butts in Ashover were, on the 11th of November, 1795; the 5th, 6th, 7th, and 8th of February, 1798; and 15th of November, 1805: and that his lowest observations were on the 30th of May, 1796, 8th of November, 1798, and 10th of January, 1806; the greatest range being very nearly two inches, and Changeable very near to the middle of this range.

Mr. William Cox, of Culland, stated to me, that in dry weather, when the Barometer there has been high, and drops regularly for some time, it is sure to bring Rain, and its rising gradually from a low state, presages fine weather; but in Changeable and Thunder Weather it often rises during Rain, and is not at all to be depended on, or in the Winter season, often then standing very high while much Rain falls, and the contrary.

Thunder or Lightning does not seem to be very prevalent in Derbyshire; I heard or saw but little, while I was in the County.

1. *Wind.*

It does not appear that there are any very prevailing *Winds* in Derbyshire, but I could hear of no Register kept of the Winds: at Ashover it was remarked to me, that it rarely blows there either from the S E or the NW. Others remarked, that a west wind, however high or strong it may blow for a short time, seldom continues long to do so.

2. *Rain.*

2. *Rain.*

By the kindness of His Grace of Devonshire, and of his Agent, Mr. Knowlton, of Edensor, I am enabled to present a very satisfactory abstract of the Rain which fell at Chatsworth during 50 years past, ascertained by an excellent and well-attended Rain-Guage in the Gardens at that place, the funnel of which seems to be about 18 feet above the Ground, and about 60 feet above the Derwent River at Chatsworth: the depth of Rain is registered by the Gardener every morning, at nine o'clock, which has fallen in the preceding Day and Night. The following are the yearly totals, viz. in 1761, 26.525 inches; in 1762, 23.399 inches; and in

Years.	*Inches.*	*Years.*	*Inches.*	*Years.*	*Inches.*
1763	36.399	1779	24.582	1795	23.531
1764	34.262	1780	19.443	1796	24.280
1765	27.536	1781	23.065	1797	30.120
1766	25.235	1782	39.115	1798	27.502
1767	30.723	1783	29.526	1799	30.995
1768	39.919	1784	22.976	1800	27.732
1769	27.255	1785	23.162	1801	28.345
1770	29.446	1786	30.676	1802	23.340
1771	22.433	1787	32.068	1803	24.270
1772	30.842	1788	19.856	1804	47.904
1773	31.281	1789	36.309	1805	22.232
1774	31.522	1790	26.892	1806	30.182
1775	33.749	1791	34.698	1807	26.365
1776	29.892	1792	34.740	1808	28.509
1777	24.794	1793	24.316	1809	29.911
1778	29.895	1794	30.769	1810	27.984

The total depth of Water fallen in this period, including melted Snow, being more than 119 feet, and giving a yearly average of 28.411 inches; the greatest yearly depths being 39.919 inches (in 1768), 39.115 inches (in 1782), 36.399 inches (in 1763), 36.309 inches (in 1789), &c.; and the least, 19.443 inches (in 1780), 19.856 inches (in 1788), 22.232 inches (in 1805), 22.433 inches (in 1771), &c.

The monthly average depths during these 50 years, appear to be, January, 2.23 inches; February, 2.15 inches; March, 1.62 inches; April, 2.00 inches; May, 1.98 inches; June, 2.09 inches; July, 2.70 inches; August, 2.64 inches; September, 2.77 inches; October, 2.95 inches; November, 2.74 inches; and December, 2.54 inches.

The greatest monthly depth recorded, being the first that the Guage was used, viz. September 1760, a month before the commencement of the present Reign, when 7.365 inches of Rain fell after the 14th of the Month!, 6.960 inches fell (in April 1782, and 4.659 next Month), 6.946 inches (in December 1763, and 6.085 next Month), 6.590 inches (in March 1765), 6.439 inches (in July 1764), 6.377 inches (in October 1778), 6.373 inches (in January 1791, and 4.291 in the Month before), 6.169 inches (in July 1763), 6.166 inches (in July 1787), 6.142 inches (in November 1770, and 5.230 next Month), 6.085 inches (in January 1764, and 6.916 the Month before), 6.046 inches (in August 1799), &c. The Months in which no Rain or Snow fell at Chatsworth, were December 1762, May 1765, January 1766, and September 1801: .097 inches only, fell (in June 1762), .109 inches (in October 1781), .113 inches (in December 1788, and .597 in the Month before), .117 inches (in March 1781), .122 inches (in April 1785, and 1.160 in the two preceding Months), .158 inches (in July 1800, and .622 in the Month before), .241 inches (in February 1779, and 1.173 in the Months before and after),

.254

.254 inches (in November 1805), .258 inches (in July 1765, and .875 in two Months before), &c.

The total number of Days, in which Rain or Snow, exceeding .030 inches in depth, have fallen, in these 50 years, is 6011; giving an average of 120 Days of Rain in each Year at Chatsworth; the greatest being 166 Days (in 1782), 159 Days (in 1792), 157 Days (in 1789), 150 Days (in 1769), 147 Days (in 1797), 145 Days (in 1799), &c.; and the least, 71 Days (in 1766), 73 Days (in 1765), 84 Days (in 1762), 86 Days (in 1777), 88 Days (in 1778), 98 Days (in 1767), &c.

The average number of the Days of Rain in each Month was nearly as follows, viz. January 9 Days, February 10, March 8, April 9, May 9, June 9, July 11, August 10, September 11, October 12, November 11, and December 11 Days; which are much nearer to an equality than might have been expected.

It is here observable, that the fewest rainy Days occur in March, and the most wet Days in October; and by reference to the averages of Months above, it will appear rather singular, that the least depth of Rain falls in *March*, with not a very irregular increase thence until *October*, when the greatest depth falls, and from whence to March again, there is another pretty regular decrease in the Monthly averages.

The most remarkable Days of Rain have been, 3.339 inches (22d July, 1779), 2.620 inches (20th September, 1760), 2.483 inches (16th July, 1764, and 1.070 the Day before), 2.475 inches (30th May, 1783), 2.415 inches (7th January, 1791, and 1.055 next Day), 2.095 inches (13th August, 1762, and 1.160 next Day), 2.062 inches (20th November, 1791), 2.000 inches (17th August, 1791), &c.

If we divide the time since this important Register was first kept, into the three largest equal periods it will admit, or of 16 Years each, viz. from 1763 to 1778, from 1779 to 1794, and from 1795 to 1810 inclusive (as in page 99), we shall find a very remarkable *decrease in the quantity of Rain* in these three periods; the first period giving an annual average of 30.324 inches in depth, the next of 28.262 inches, and the last of no more than 27.079 inches! and yet, what is perhaps more remarkable, the number of *Rainy Days have increased* through these periods! having been in the 1st period only 109 annually on the average, but amounting to 127 yearly in each of the two last periods: they being five times below 99 Days in the first 16 Years (and 84 and 109 Days only gave Rain in the two preceding ones), as mentioned above; only four times below 115 Days in the second period, viz. 112 Days (in 1780), 108 Days (in 1788), 105 Days (in 1779), and 102 Days (in 1785), two of which commence the period; and only five times below 123 Days in the last period, viz. 120 Days (in 1805), 115 Days (in 1803), 114 Days (in 1810), 113 Days (in 1807), and 111 Days (in 1795), the last being at the commencement of this period. In the 1751 Wet Days which happened in the first period, .277 inches of Rain fell each Day on the average; in the 2032 Days of Rain in the second period, .222 inches fell in each; but in the 2035 Wet Days of the last period, only .213 inches of Rain fell on the average per Day! In the last period, the daily quantity never once amounted to 2 inches, and but once did the monthly quantity reach 6 inches (viz. August 1799, 6.046 inches), although these occurred many times in the first two periods.

I will not hazard conjectures as to the causes of this remarkable decrease of Rain, and increase of humid weather, at Chatsworth; but may remark, that the decrease cannot be ascribed to the cutting down of Woods in the vicinity, as has frequently been assigned in similar cases: and though extensive Plantations have been growing up around Chatsworth, particularly in the two last periods, and in particular spots in various other parts of the County, and in the adjoining Counties, their quantity seems too small, I think, to have affected the Clouds and vapours in any thing like the degree which this Register of the Rain indicates. Those who have adopted the reasoning of Mr. Williams, in his work on the "Climate," may perhaps be disposed to assign some of this increase of humidity, to the great decrease of Furze, Heath, and other indigenous plants, in this and all the adjoining Counties, in the progress of Enclosures, and the consequent improvements made during the last 32 Years, and to the great spread of White-thorns in the new Hedges, and the propagation of other plants, which perspire largely, according to Mr. Williams's experiments and reasonings; the subject is one to which I have not sufficiently attended, to offer any opinion of my own.

I cannot sufficiently commend the noble owner of Chatsworth for persevering with this Register of the Rain, or say enough to enforce its imitation by other Noblemen and Gentlemen, whose Green-House and Garden establishments, offer like facilities for duly and correctly keeping such Registers, which would in time prove of the greatest importance, as the foundation of a Science of Meteorology.

I am happy to be able to add, a comparative monthly statement of the Chatsworth with two other Registers of Rain, kept in Derbyshire in the Year past; one of which is by Mr. William Milnes, at the Butts in Ashover, the Guage standing in his Garden about 3½ feet above the ground; the other is by Mr. Thomas Swanwick, of the Commercial Academy, in St. Mary's Gate, in Derby, viz.

1810.	*At Chatsworth.*	*At Ashover.*	*At Derby.*
January	0.577	1.15	1.100
February	2.145	1.46	1.844
March	2.096	2.13	1.505
April	1.924	1.45	1.326
May	2.890	3.40	3.201
June	0.874	1.05	1.421
July	2.928	4.07	3.008
August	2.924	5.21	3.400
September	2.134	1.32	1.850
October	1.726	2.13	2.522
November	4.502	6.11	6.161
December	3.174	3.19	2.256
	27.984	32.67	29.594

Mr. Swanwick, I am told, transmits his Register monthly to the Derby Mercury for publication, and I heartily wish that several other Gentlemen, in different parts of the County, would follow his example.

The average of the above three Registers in Derbyshire, in November 1810, gave a depth of 5.621 inches of Rain, which is more than double the average of the 51 Novembers since the Register was kept at Chatsworth, and exceeding that of any November in that period, except in 1770 (6.142 inches), and 1791 (5.951 inches). And this circumstance agrees, with the great excess of Rain in that Month, above any preceding ones for a considerable time back, in the Registers kept in and near London.

At Nottingham, the depth of Rain is stated to be about 24 inches annually; at Sheffield, in Yorkshire, 33 inches. At Manchester it was about 29 inches, and at Wakefield about 31½ inches, in 1809. At Thornhill, near Wakefield, 18.155 inches in 1788, and 33.735 in 1789.

SECT. IV.—SOILS.

BEFORE entering on Soils and Minerals, the proper subjects of this and the next Section, I shall be necessitated to enter at considerable length, into the subject of the Terrestrial *Stratification*, on account of there being no elementary Geological or Mineral Work published, to which I can refer, for all the necessary and preliminary information, that should enable a Reader, not practically acquainted with the subject, to understand the curious and important consequences, to Mining, Agriculture, and indeed to numerous others of the useful Arts, which result, from the admirable and regularly stratified structure of the planet we inhabit, the stupendous fractures and dislocations which its stratified Mass has undergone, and the subsequent Denudation, Abruption or carrying away of various parts of its surface; and above all, the general excavation of Valleys therein, by which the Great Creator has in so admirable and perfect a manner fitted it, for the various uses of Man and the numerous other organized Beings, with which he has since stored its surface and waters.

The general principles of stratified masses, and the consequences of breaking or cutting these in various directions, has been so little treated of by Authors, and are understood fully, by so few of those with whom I have conversed, that I trust I shall be excused in treating of them here, in as plain and familiar a manner as I am able.

On Stratified Masses.

A number of extended and continuous masses applied upon each other in contact, constitute a stratified mass, whether the strata composing it are plane and of equal thickness throughout, as the leaves of a book, or are of irregular shape and thickness, as the annual layers of wood round a tree, and its several knots or the insertions of its arms or principal branches; or the several concentric coats round an onion. In the two latter cases, the strata or lamina composing the tree and the onion, return into themselves or form rings, in one of their dimensions, while in the opposite one, they spread into roots and branches, at their different ends.

On the Sections of Stratified Masses.

If we contemplated only the central part of the leaf of a book, without seeing its edges, or the plane of any stratum only, we should be as unacquainted with the internal structure of its mass, as the first observers of a Tree or an Onion were; who seeing only their Bark or outer skin, knew or suspected nothing of their internal structure, different from that of a Carrot or Potatoe, or even of bodies still more homogeneous and unstratified. It is therefore from the sections or edges, that our knowledge of stratified masses are obtained: and it follows, from the very nature of continuous planes or surfaces, intersecting each other, that *in whatever form we cut or divide a stratified mass, every distinct edge of a stratum must either return into itself, and form a ring, or extend each way in a continued line*, however crooked the same may be, to the utmost limits of the mass and the section. The edges of a Book, wherein the straight surfaces or planes of the leaves are intersected by another plane at its edge, and where each edge of a leaf or stratum forms a straight line, is the most simple case of this problem; should the gnawings of a mouse or an insect, or the devourings of a flame of fire, have operated partially on the edges or top of a Book, as too often has happened, we are then presented, with all imaginary forms of crooked and serpentine lines at the edges of our Book, each either continued through its whole length, when we contemplate any particular leaf; or of as varied forms of rings, made by the edges of leaves which have been perforated at the top or from below, or of which only portions are left, surrounded by the devouring effect. In like manner, if we contemplate the forms in which the annual circles of wood in a tree (whose surfaces are irregularly cylindrical) are presented to view on the plane surface of a Board, in our Floors, Tables, &c. we shall again observe, that every distinct lamina or edge of a stratum therein, can be distinctly traced through the whole length of the Board and out at each end, or, that they return into themselves, and form rings, as is commonly the case round each knot for a certain distance, each successive ring round a knot being more and more elongated as we proceed outwards, until at length they pass off at both ends of the Board, and parallel or continued strata succeed. The section of an Onion by any kind of continued surface, either plane, or curved in any manner, will still be found to present the same appearances either of strata returning into themselves as rings, or extending out at each end, towards the roots and branches. And either experiment, or a slight reflection on what has been stated above, will shew, that in whatever form we furrow out a surface, or make artificial valleys or hollows upon either the Book, the Tree, or the Onion, still the same appearances, and those only, will present themselves, viz. of edges of the strata (more or less oblique and broad) forming rings, or else continuing on, each to the utmost limits of the cut surface.

Application of the above, in a general way, to the Stratification of England.

It is now about 19 Years since, that Mr. *William Smith*, of Mitford, near Bath, contemplating the great regularity of the numerous strata in the Coal-works, in the superintendance of which he was then employed, in the neighbourhood of High-Littleton, in Somersetshire, and the generally prevailing *dip*, or descending of strata towards the eastward, and consequent rise and crop or basset of them towards the opposite point; happily conceived the idea, and shortly after began putting it in practice, of actually tracing the edges of a certain number of the most conspicuous Strata, from the place of their entry on our Island on the south Coast, to their exit again therefrom in the German Ocean. In a few years he had so far succeeded in this attempt, as to have traced several strata, and delineated their entire British course on his Map, from one Sea to the other, as he expected. In the prosecution of this first part of his survey, Mr. Smith fortunately succeeded in detecting, and defining more accurately (than has yet been done by most writers on the subject), the *Alluvial or Gravelly Matters*, composed of the ruins of strata, which he found so plentifully distributed over the surface of England, but forming quite a distinct class from the regular Strata, *among or under which it never is found.* This idea may in a degree be familiarised perhaps to some, by considering Gravelly mixtures as the surface or last covering matters of the Earth, as the Bark is of a Tree, which is never found between its lamina or ligneous strata, and so of the Back or Binding of a Book, with respect to its leaves: but a more close analogy may be traced, between occasional patches of Paint, or other matters, placed upon a Board, covering there, not any particular lamina or annual ring (as the Bark always does the white wood or Sap-wood which was formed in the preceding year), but covering indiscriminately several different ligneous strata. And thus it is, that large patches of Gravel and Alluvial matters, present one of the two most formidable obstacles to Mineral Surveying (the other of which, the Faults, will be mentioned further on), and to the ready tracing and observing of the edges of all the strata, which otherwise must long ago have been accomplished *, and the structure of the habitable parts at least of the earth have been, ere this, well understood.

Another curious and important discovery by Mr. Smith was, that certain Shells, Bones, impressions of Vegetables, and other Organic Remains *are peculiar to, and are only found lodged in, particular strata,* or free chalk, with numerous layers of Flint nodules, and great variety of Echini and other organized remains*: the extremities of this stratum are to be found with us, in the Isle of Wight in Hampshire, and at Flamborough Head in Yorkshire.

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* The Rev. John Mitchell made a list of 11 principal strata in their order, before Mr. Smith took up the subject, but carried it to no useful conclusions, that I can learn. See Philosophical Magazine, vol. 36, p. 102, and vol. 37.

The Lower or *Hard Chalk* is without Flints; its beds increase in hardness, until near the bottom, where a white Freestone is dug, at Totternhoe in Bedfordshire, and numerous other places: that brought from near Ryegate and other places on this stratum, south of London, is used as a Fire-stone.

The *Chalk Marl* next succeeds, which varies much in its appearance, sometimes resembling Chalk when first exposed, in other places appearing as a blue Clay.

The *Aylesbury Limestone* strata with green sand-beds, are remarkable for their large Cornua-ammonis, numerous Horse-head Muscels, Trochi and other Shells, Glossapetra, &c.

Sand strata succeed, and several *Clays* which have no very decided character, except one of them, which contains a thin bed of dark-coloured Limestone, almost entirely composed of small turbinated shells, called *Sussex Marble*, of which the slender pillars in Westminster Abbey, and most of our Cathedrals, are made.

The next characteristic stratum, owing to its forming a Ridge of conspicuous Hills through the country, is the *Woburn Sand*, a thick ferruginous stratum, which below its middle contains a stratum of Fullers-earth, which is the thickest and most pure, in Aspley and at Hogstye-end, two miles N W of Woburn, of any known place: the upper parts of this sand, are fre-

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* Many of these are enumerated in the Philosophical Magazine, vol. 35, p. 42 and 138.

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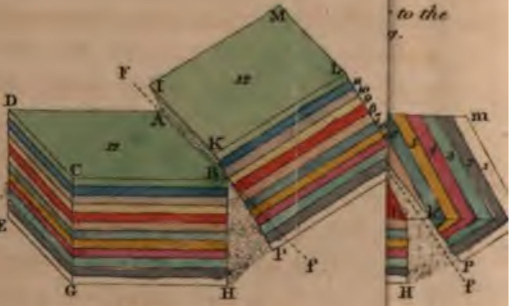
Rise parallel, and tilt to the fault



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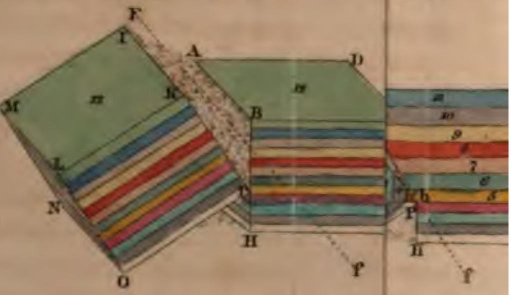
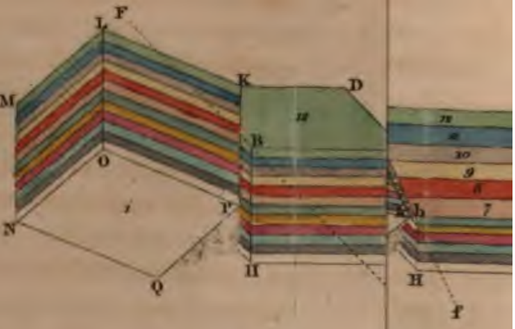
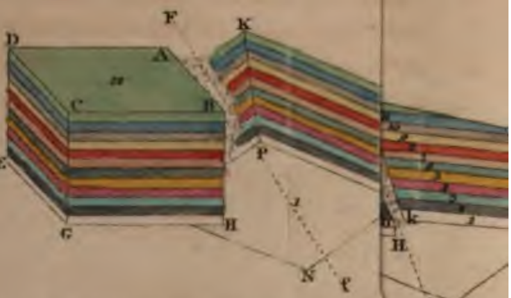


7
Rise increasing, and tilt to the fault



8
Rise increasing, and tilt from the fault



Note. F.f. represents the line or direction of th represents the quently cemented by the oxidated iron, into Car-Stone, and the lower parts contain fragments of silicified Wood.

The *Clunch Clay* succeeds: it is generally blue, or inclining to black, and is of great thickness: it has towards its top several beds of Clunch, a soft chalk-like stone, in appearance, whence the name: numerous large Gryphites and small pointed Belemnites, Cornu-ammonis, Selenite, &c. are found above the Clunch: the lower part frequently contains beds of bituminous Shale or Clay. The Vale of Bedford, the Fens of Cambridgeshire, Lincolnshire, and Yorkshire, are almost entirely situated upon the great planes formed by the gradual endings or feathering-out of this stratum.

The *Bedford Limestone* succeeds: it has blue Clay beds interposed, and abounds with small Gryphites, and other Shells. Buckingham, Stoney-Stratford, Newport-Pagnel, and Bedford, stand upon this stratum; so does Peterborough, Sleaford, &c.

A thick *Clay* succeeds, and then the famous *Rag-stone* of Barnack, and numerous other places, composed almost entirely of minute Shells and small fragments of Shells, whence the stones were dug, for many of the most ancient and perfectly preserved Churches and ancient Buildings in the Eastern Counties.

The Limestone and grey Slate strata of Stonesfield, *Colly-Weston*, and numerous other places, next succeed, and abound with Bones, Glossapetræ, and other Organic Remains; and then,

A *Sand* Stratum.

The *Bath Freestone* strata next succeed, and form a most characteristic range through England, from the Isle of Portland in Dorsetshire to the Humber in Yorkshire: Stamford, Ancaster, and Lincoln, are upon this stratum, Plate IV. to face Page 113.

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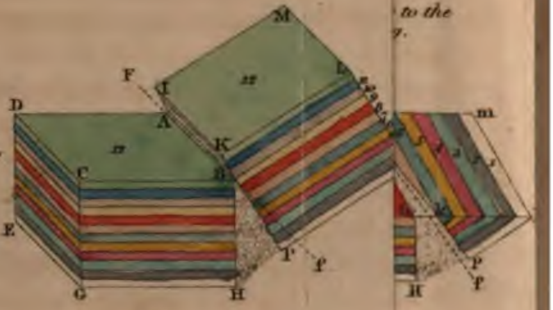

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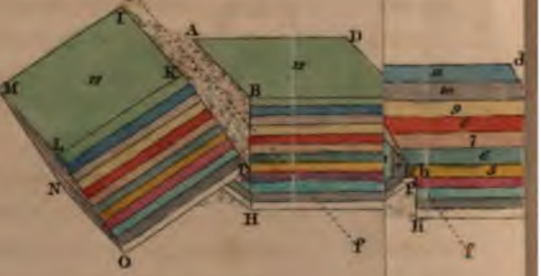
Rise parallel, and tilt to the fault



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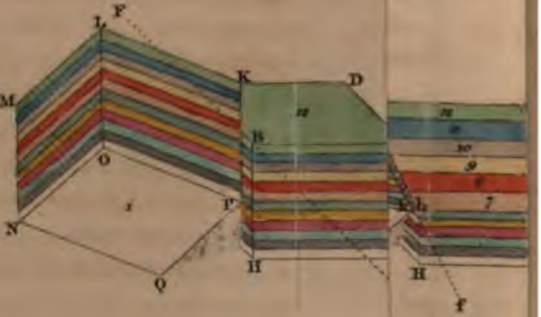
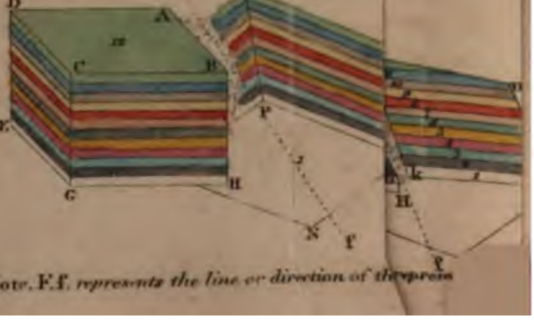


7
Rise increasing, and tilt to the fault



8
Rise increasing, and tilt from the fault

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A *Sand* Stratum.

The *Bath Freestone* strata next succeed, and form a most characteristic range through England, from the Isle of Portland in Dorsetshire to the Humber in Yorkshire: Stamford, Ancaster, and Lincoln, are upon this stratum, in its range to the eastward of Derbyshire. The upper part is generally a white or light grey Limestone, then the Ova-formed Limestone or Oalite of Portland, Bath, Ketton, &c. succeeds; below which is a great thickness of light yellow Freestone, which abounds with curious Shells and Fossils. Below this, a sand and clays occur, and then the Freestone of so many hues, of yellow and red, which is dug near Northampton, and numerous other places on this Range.

A number and great thickness of Sands and Clays succeed, which admit of no precise or characteristic description, in so brief an account as this is intended to be.

The *Maidwell Limestone*, or blue Marl-stone (so called by Mr. Smith, from the matter in which it is imbedded), succeeds, and then other Clays; which are succeeded by,

The *Lias Clay*: this stratum is of considerable thickness, forming generally a light yellow tenacious surface, cold, and much disposed to Ant-hills, when laid down in pasture: a part of this stratum approaches within 3 or 4 *m.* of Derbyshire, which has enabled me to introduce it in the Map of Strata and Soils facing page 97. It is there distinguished by a blue colour, through a part of Leicestershire and Nottinghamshire, from Wigstead to Cotgrave. This clay is rendered remarkable, by a *Limestone* in thin blue beds, called *blue Lias*, which it contains; two or three of which beds make a Lime, which is superior to any other that is known, for Sluices, Locks, Piers, and other water-works, on account of its property of setting almost immediately even under sea-water, and continuing to harden. Watchet and Aberthaw, on opposite sides of the Bristol Channel, Southam in Warwickshire, and

Barrow on Soar, within the limits of our Map, are particularly famed for this Lime, and which probably might be had as good, at numerous other places throughout the long range of this stratum, extending from one Sea to the other without much interruption, I believe, if the same judgment and care were used, in selecting the beds most proper for water Lime, instead of burning together the whole of what they dig, without selection or discrimination, as is too commonly done at Lime-Kilns. From the limits of our Map this stratum proceeds N E, across Nottinghamshire to Long-Bennington, Coddington near Newark, &c.

The Blue Lias is remarkable, owing to the pentacrinus, the Bones, scaly Fish, and other fossil remains, which it produces, throughout its whole extent, and it has on the whole, perhaps, the best marked and most important Geological characters, of any Stratum in the British Series.

In the lower part of the lias Clay, a great succession of other Limestone beds often occur, called *White Lias;* but at Barrow on Soar, and other places within the limits of our Map, they appear only as a whitish Marl, in the Banks of the River and elsewhere, mouldering with the weather.

A *Sand* terminates this series, which appears at Balderton, near Newark, &c. and a new one succeeds, called the *Red Marl* (from such often being its colour and nature), Red-Ground, Red-Earth, and other similar appellations; it is of unequal, and often of very great thickness; and is distinguished from all the strata which have preceded it in the above enumeration, by the very extraordinary and anomalous masses which occur within its limits, as well as by its not having a defined western edge, from whence the same inferior strata are seen to basset or come out throughout its whole length, as happens with the other strata above it; and as being the stratum, whose upper part or eastern bounds, mark the limits, to the Eastward of which, it is utterly hopeless to expect to find Coal in England, except by enormously deep pits, sunk at least through the Lias-Clay and Red-ground, as is now attempting to be done, under Mr. Smith's direction, at Bath-Eason, in Somersetshire, with what prospect of success, I am unable to judge, from any thing which has been attempted in Derbyshire, Leicestershire, or Nottinghamshire, where no trials have come to my knowledge, of penetrating even through Red Marl, in search of Coals, though in Somersetshire this is said to be constantly done.

A natural division of the British strata being thus as it were marked out, by the basset or first appearance of the Red Marl on the Surface, from under the edge of the Lias Clay, I shall reserve what I have further to say upon this stratum, until I come to speak of my own observations on the Derbyshire strata, of which this Red Marl is the highest stratum; and here close my account of *Mr. Smith's* meritorious labours and discoveries, lamenting my inability to do any justice to them, in the imperfect sketch which I have presented, which I cannot however do, without sincerely hoping, that such a desire may speedily be excited, for the publication of that Gentleman's valuable Maps and Papers, and descriptions of his Fossils, illustrative of the British Strata, as would induce him to lay bye his professional engagements, in order to publish them, or which should dispose him to give them up, to such persons as would speedily bring them before the public.

I shall be unable to proceed, in detailing the series of strata which appear from below these, in Derbyshire and its environs, without first resuming the subject of *Stratified Masses* (left off in page 108), in order to point out the effects of *breaking and dislocating* such masses, and afterwards of cutting and *denudating** them in various directions; a subject which I have never seen touched upon in any Author, and must therefore claim the indulgence of my Readers, in order to go somewhat particularly into it, as the Theory or foundation of Mineral Surveying, by the application of which, I propose, to explain the number and position of the principal strata in Derbyshire and its Environs, from the examination which I have made of their surface; the leading features of which are exhibited in the two Maps facing pages 1 and 97, the first of which is already described in the Section I.

Description of Plates III. *and* IV., *facing Page* 113.

The 56 figures of Stratified Masses, which occupy *Plates* III. and IV., form but one connected series, and are only thus divided, for the convenience of folding into my Report; and which is the reason, that the numbers 1, 2, 3, 4, 5, 6, 7, and 8, of the figures down the first column, are continued through both plates, as also, that the numbers 1, 2, 3, 4, 5, and 6, of the cases along the top, are the same in each plate. The words engraved under the figures and cases, are those by which I have denominated* the several forms of dislocated stratified masses, as the best for general use which occur to me; being aware, however, that they are much wanting in simplicity, and somewhat also in precision in some few instances; yet they will, I trust, prove of use, until something better is done on the subject.

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* The examination which I made in 1805 and 1806, of the south-eastern parts of England, and the discovery of the *great Southern Denudation* (see Philosophical Magazine, vol. 35, page 130), shewed the necessity, of introducing a new term for this Geological phænomenon, which has been explained in Dr. Rees's new Cyclopædia, article *Denudation*.

The several names in the first vertical column, each apply to all the seven figures which follow it in that horizontal column, and the Names on the top of the several vertical columns, each apply to all the eight figures below it: my intention being, that the Names on the side and the top of the Tables should be combined, for defining each case in the interior of the plate; the second figure, for example, is a "Tilt to the Fault, and Section parallel to strata;" the next is, a "Tilt to the Fault, and Section parallel to the Fault, and inclined," &c.

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* Near 70 Names for *Faults*, or dislocations of the strata, have occurred, either in reading, or in my conversations with practical Colliers, Miners, Quarrymen, and Well-sinkers, in different Counties; viz. Back, Break, Breast, Cast, Chap, Cleft, Crack, Coin, Comb, Depression, Dip-dyke, Dislocation, Down-cast, Down-leap, Down-slip, Down-trap, Dyke, Fall, Fault, Fissure, Flooking, Gall, Gash, Gaw, Gossan, Gulph, Heave, Hitch, Horse, Jump, Knot, Leap, Leap-down, Leap-up, Let-down, Lift, Lift-up, Load, Lum, Mare, Meer, Rake, Rent, Ridge, Rift, Rise, Rise-dip, Rise-dyke, Rise-up, Sept, Shake, Shift, Sink, Sink-down, Slip, Step, Throw, Throw-down, Throw-up, Trap, Trap-down, Trap-up, Trouble, Up-cast, Up-leap, Up-slip, Up-trap, Vein, and Wam; and yet all these, seem indifferently applied to any one of my Figures; the distinctions which they indicate, being only those of a rise or a sink, simply, except as to the width, the state of, or the kind of matters filling fissures; several of them are also occasionally applied to the case of a fissure filled with extraneous matters, or fault-stuff, but whose adjacent piles of strata have suffered no alteration of level, or in the position of their planes, and which consequently do not materially affect the Surface, as all other cases of Faults do.

In order to avoid the frequent use of long Names in my descriptions which follow, I shall, in mentioning and referring to the several cases, combine the horizontal with the vertical series of numbers on the top and in the front of the plate, as Mathematicians do the indices of the powers of numbers or quantities; thus, 1^1 will signify the second figure, 1^2 the next, &c.; and as, perhaps, owing to the inconvenient lengths of the Names above, this mode of reference may prove useful on other occasions, for distinguishing these several cases or Forms of strata in my 56 figures, I shall borrow a Latin prefix for greater distinction, and call the above, *Forma* 1^1, *Forma* 1^2, or Formæ 1^1, 1^2, &c.

The several cases of simple dislocation without a subsequent denudation of the surface, in the first vertical column, being called *Forma* 1, *Forma* 2, &c.

And this arrangement may continue, and be extended to more cases of cutting, as well as dislocating, if such should arise or be contemplated in Theory, as conical or branching excavations, &c. without disturbing the order or reference to those herein described.

Cases of Dislocated Strata.

Each of the 56 Figures or Formæ in *Plates* III. and IV. represent a stratified Mass, consisting of 12 laminæ or strata, distinguished by as many colours and numbers; broken into two parts, one part or pile of which, marked on the top A B C D, if entire, or a b c d if cut or denudated, is considered in each case as fixed, or remaining unmoved, for the purpose of referring to its fixed position, the motions of the other pile; which is marked I K L M on the top when entire, or i k l m when part only of it remains; as also, for referring to or describing the position of, the cutting plane **d a i m l k b c** (or cylindric surface in some cases) which gives the form of the new surface. The fixed pile has necessarily been turned, sometimes to the right hand, and sometimes to the left, in the different horizontal columns, in order to favour the perspective representation of the other pile.

By the term *Fault*[*], I mean the fissure or plane of separation between adjacent piles of strata; and by the *range* or direction of the Fault[†], I mean its line upon the surface, which is distinguished, by a dotted line **F f** in every formæ 1, 1^1, 1^2, &c. of the plates. When I intend to speak of the extraneous matters filling the Fault; which is what the Miners often mean by that term and its numerous Synonyms, and Mr. Williams calls the *Vise* (see "Mineral Kingdom," 2nd ed. I. 17), I shall call them *Fault-stuff*, in imitation of those Miners, who call the matters or produce of a Mineral Vein, *Vein-stuff*[‡].

In breaking off part of a stratified mass at right angles to the planes of strata, and tilting the part so detached, as is done in all our Formæ except 3, 3^1, 3^2, 3^3, &c. and 4, 4^1, 4^2, 4^3, &c. the cracks or cavities thereby occasioned, and here represented as filled with Fault-stuff, are of a very wedge-like form, greatly more so than they are found to be in the Earth; where, owing to several nearly parallel Faults or branches or divisions of the same Fault, according to Mr. Williams (Mineral Kingdom, 2nd edit. I. 21) generally ranging near to each other, where such tilts or changes of the dip take place, this wedging form of the Fault-stuff is less perceivable, than it would be in a single Fault, and perhaps also, owing to the removal of a wedge-like pile of strata, in extreme cases of tilts, the Faults approach to an uniform thickness or width of Fault-stuff, throughout: as if, a wedge-like slice, thickest at top, were cut off the end A B H or I K P in Forma 1; or one or two similar pieces, but thickest at bottom, in Forma 2. I preferred shewing the piles of strata in those plates, as simply broken, displaced and tilted, notwithstanding the Faults are thereby shewn of an unequal width or triangular form upon the new surface, in Formæ 1^3, 1^4, 1^6, 2^3, 2^4, 2^6, 5^3, 5^4, 5^6, 6^3, 6^4, 6^6, &c.

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[*] The *Throw* of the Yorkshire Colliers.

[†] If the surface be a plane, or if the plane of a Fault be vertical, this range upon the surface, will be definite and clear, but if the surface of the Ground undulates and the Fault *hades*, or has its plane inclined to the vertical, its range on the surface will be crooked, and then, as in describing the course and dip of a stratum, a *level-line* must be conceived to be drawn by the side of the Fault, or upon its plane, the direction of which level (as E and W, N and S, &c.) will correctly mark the *range* or course of the Fault; and a perpendicular to this level-line, will mark the direction in which it hades, or underlays and over-hangs. The above is applicable also, to the course and hade of Mineral Veins and Win-Dykes, as well as Faults.

[‡] Several Writers, some even of the most modern, confound Faults and Mineral Veins together. See Mr. Westgarth Forster's "Treatise on a Section of the Strata," Newcastle, 1809, p. 21, 23, 64, &c.

Formæ 1, 1^1, 1^2, 1^3, 1^4, 1^5 and 1^6, and Formæ 2, 2^1, 2^2, &c. represent the cases, where strata are merely inclined, without rise or sink at the Fault, or joint on which the tilted piece or pile turned, as it were on a hinge, and are called the "Tilt to" and the "Tilt from" the Fault.

Formæ 3, 3^1, 3^2, &c. and Formæ 4, 4^1, 4^2, 4^3, &c. represent the cases, where one pile of strata has risen, in close contact with the other or fixed one, either parallel to its former position, or inclined thereto in the direction of the fissure, but without tilt to or from it, and are called "Rise parallel" and "Rise increasing."

Commonly, Miners content themselves with observing, that a Fault rises or sinks, throws up or throws down the measures, so much, at a certain point, where they happen to have driven through the Fault-stuff, or to have sunk shafts near, on the two sides of it; conceiving the Fault to be a rise parallel, Forma 3; whereas, had such observations been multiplied, on distant places in the range of the Fault, different degrees of rise or sink would have appeared in the measures, and the Fault would (as much the larger portion of them in strictness do) appear to have a "Rise increasing," one way, and of course decreasing the other; a fact which had not escaped the late Mr. John Williams, in such cases where the Faults range from basset to deep (Mineral Kingdom, 2nd edit. I. 24), because such are most exposed to the Collier's observation, but which I believe to be equally common to those other Faults, which range with the basset-edges of the measures. And here it may be proper for me to remark, that I have uniformly found such increasing rise, where it occurs, to continue increasing one way and decreasing the other, until cross Faults intersect; which cross Faults shew generally, either, a "Tilt from" the cross Fault at the increasing end, and a "Tilt to" it, at the decreasing end.

Formæ 5 and 6, combine the cases of Formæ 1 and 2, with that of Forma 3; the throw or quantity of derangement having here no increase either way, while the strata are Tilted, either "to" or "from" the Fault: these are called "Rise parallel and tilt to," and "Rise parallel and tilt from" the Fault.

Formæ 7 and 8, combine the cases of Formæ 1 and 2 with that of Forma 4, the rise here increasing one way, while the strata are either, Tilted "to" or "from" the Fault; these are called the "Rise increasing and tilt to," and the "Rise increasing and tilt from," the Fault.

The arrangements of the Strata are similar in each figure, throughout each horizontal line of the plate, as will appear by comparing Formæ 5, 5^1, 5^2, 5^3, &c. with each other, and so of any others.

Having, as I hope, sufficiently described the several positions, of pieces or piles of dislocated strata; I proceed to notice, one of the most curious and important Phænomenon which the Earth's surface presents, viz. that though the strata are as it were tossed and turned about, in all degrees of the several cases which are mentioned above, as experienced Miners and Colliers in particular, well know and can testify, yet that it is extremely rare to find a lifted edge, or a corner of strata, standing up above the general surface, or occasioning a precipice or cliff*; such as all the figures after

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* Numerous as the *Cliffs*, Facades, Mural-ascents or Precipices are, in this and most other Rocky Districts, a careful examination of the adjoining strata, and an enquiry into the facts ascertained by mining or quarrying at the foot of such Cliffs, will shew, that very few indeed of them, are owing to Faults and dislocations of the piles of strata composing the Cliffs, and the low lands before them; but that in general, the matter has been excavated or carried off, which occasions the Valley or Plain at the foot of a Cliff, as in most of the numerous cases of Valleys particularized herein at page 64, and as I have particularly shewn by an engraved *Section* across one of these Valleys, viz. Matlock-Bath Dale, in the Philosophical Magazine, vol. 31, p. 36, or Plate V. herein, facing page 129.

Mineral veins often accompany the face of a Cliff, in the Mineral district, the vein-skirt of which, cements together the different beds of Stone, and preserve them from decay or falling, and often gives the whole the appearance of an unstratified Mass; but such vein fissures have had after the first two in our first vertical Column exhibit; the Faults, however large the rise which they occasion, rarely being discernable, by any sudden inequality of the surface! This occasions the necessity, of combining the different cases of *cutting* stratified Masses, with the several cases of the previous *dislocation of their parts*, in order to render the Theory complete, and requires so many figures or *Formæ*, in order to see and understand the appearances, which the cut surface will assume, in consequence of these combined operations.

Cases of the Cutting or Sections of dislocated Strata.

Each of the vertical Columns after the first, in *Plates* III. and IV. represent a similar cutting of a dislocated stratified Mass, similar in each case to that shewn opposite, in Column 1.

Formæ 1^1, 2^1, 3^1, &c. in Column 2, represent cutting, by a plane daimlkbc, parallel to the fixed planes of strata A B C D, or E G H; of course, in each of such cases, the whole of some stratum of this pile appears at top, and no edges of strata are exhibited by such cutting of the fixed Mass; as happens with the other pile or mass in each case, but Forma 3^1, where, owing to the "Rise parallel," this section or new cut surface, is uniform and without edges of strata: these are called "Sections parallel to strata."'

Formæ 1^2, 2^2, 3^2, &c. exhibit the Sections by a plane, which cuts the plane of the Fault in a line parallel to, or

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had a very different origin from those of Faults, and in Derbyshire very rarely, if ever, dislocate vertically, as Faults mostly do. The straight Cliffs on many coasts of the Ocean, may in like manner be owing to fissures analogous to Veins, as Mr. Williams remarks (Mineral Kingdom, 2nd edit. I. 16), but who confounds Faults and Veins in this and most other parts of his Work.

or at an uniform depth below, its top, or range F f; such cutting-plane being always inclined to the plane of strata in each Mass (as otherwise, the case already described would recur again), whence such are called "Sections parallel to the Fault and inclining."

Formæ 1^3, 2^3, 3^3, 4^3, &c. exhibit the Sections by a plane, which cuts the fixed pieces, or piles of strata, parallel to their edges A D or B C, that are supposed to be perpendicular to the range of the Fault F f, but without being parallel to any strata (in order to avoid previous cases); such being denominated "Sections perpendicular to the Fault and inclining."

Formæ 1^4, 2^4, 3^4, &c. exhibit the Sections by a plane, which is oblique or inclined, both to the range of the Fault F f, and to the planes of strata, which are called "Sections oblique inclining to the Fault."

The remaining two Columns of figures are intended to assist, in forming an idea of the effects of excavating Valleys on dislocated strata, by exhibiting their most simple case, that of a semi-cylindrical excavation.

The first, ranging with the Fault, or having it along the bottom of the Valley, is called, "Cylindrical excavation parallel to the Fault;" the other, crossing the range of the Fault, or having the same through both the adjoining Hills, is called "Cylindrical excavation perpendicular to the Fault."

Here it has been found necessary, both to favour the perspective representation of the sides of the excavations in these two Columns, Formæ 1^5, 2^5, 3^5, &c. and 1^6, 2^6, 3^6, &c. and more closely to imitate Nature, to shew also "Sections parallel to strata" (as in Column 2), in order to remove the projecting edges and corners of the dislocated piles, and such cut edges are distinguished by towards the same end F of the Fault. Forma 2^2, represents strata dipping from the Fault and each other in different degrees. Forma 2^3, represents one pile a c dipping parallel to the Fault in the direction f F, and the other obliquely from the end f of the Fault; while in Forma 1^4, both piles dip obliquely from the same end of the Fault f *.

But the most observable circumstance attending all the Formæ 1^1, 1^2, 1^3, &c. and 2, 2^1, 2^2, 2^3, &c., where no perpendicular rise has happened, as appears by the 12th or Green Stratum in each pile coinciding in Forma 1, and the 1st or White one in Forma 2, is, that in proceeding lengthways of the plane or surface d m l c, as the figures on the several strata direct, there is no interruption or break in the series, which in Forma 1^1 is Nos. 10, 9, 8, 7, 6, 5, 4, 3, 2, 1; in Forma 1^2, Nos. 10, 11, 12, 11, 10, 9, &c. and so of the series of Numbers in the other plane, as well as in the cylindrical excavations, in the two last columns.

What has been said above must suffice, for shewing the method of tracing the direction and degree in which the strata 1, 2, 3, 4, 5, 6, &c. dip, with regard to the cut or denudated surfaces a b c d, or i k l m, in all the remaining Formæ; and I proceed to point out the

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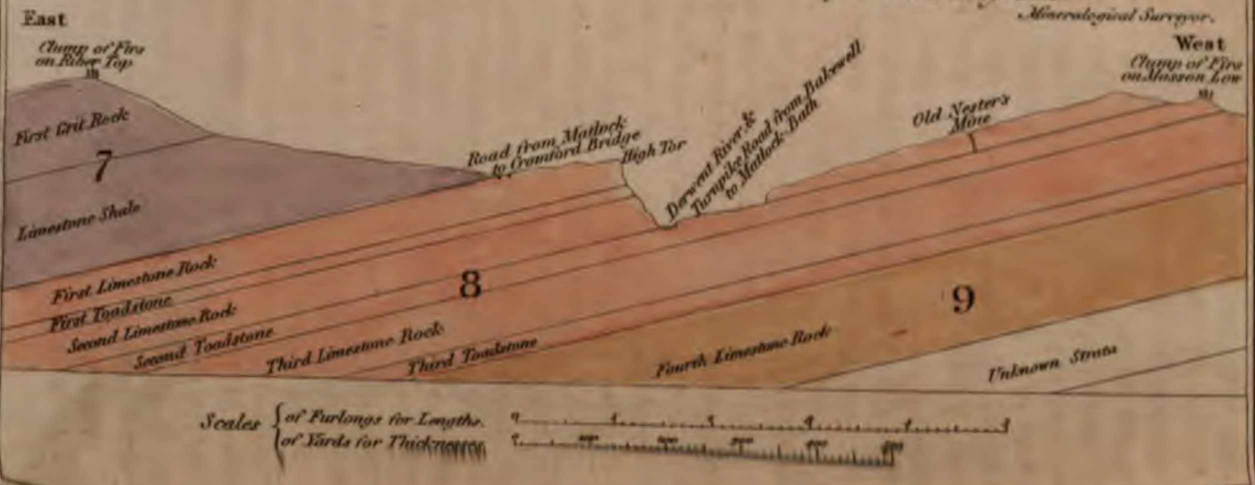
* In Formæ 1^1, 1^2, 1^3, 2^1, 2^4, 2^5, 3^1, 3^2, 3^3, 5^1, 5^2, 5^3, and 6^1, 6^2, and 6^3, all the strata range, or have their basset-edges, or courses, parallel to the Fault; also in Formæ 3^4, 3^5, 4, and 4^1, the same range perpendicular to the Fault, and in all the remaining cases, the range changes with the Fault, being in some parallel on one side, and either perpendicular on the other (as Formæ 4^2, 4^3, &c.), or inclined (as Formæ 7^4, 7^5, 8^4, 8^5, &c.), or, the basset-edges range perpendicular to the Fault on one side, and are inclined on the other (as Formæ 1^5, 2^2, 5^5, 6^5, 7^5, 8^5); or such ranges of strata are inclined to the line of the Fault F f on both sides, either the same way (as in Formæ 3^4, &c.), or contrary ways (as in Formæ 1^4, 2^4, &c.)

more

Plate V. to face page 129.

A Section of the three lowest aſsemblages of STRATA known in Derbyshire; coloured Purple, Vermillion, and Orange, on the Map of Strata & Soils, facing Page 97 Shewing the thickneſses & positions of these several Strata, as they appear acroſs Mattock-Bath Dale (Page 68) at the High Tor Rock.

By John Farey Sen.r
Mineralogical Surveyor.



more material circumstances, viz. that in the "Rise parallel" or third horizontal column, the derangement is represented such, that stratum 1 is brought opposite to stratum 6, or the degree of derangement is 5 strata (supposed here to be of equal thickness for simplifying the matter), and that throughout these cut or denudated surfaces, there is constantly a derangement of 5 strata on crossing the Fault, as in Forma 3^1, from No. 4 to No. 9, in 3^2 from No. 6 to No. 11, in 3^3 from No. 3 to No. 8, No. 4 to No. 9, &c.; and the same, whether the strata exactly match as in Forma 3^3, or are a little deranged as in 3^4; the proportion of derangement still continuing throughout, in such cases.

So also, in Forma 5 the derangement is represented such, that stratum 12 is opposite stratum 9, or the degree of derangement is the thickness of 3 strata; which interruption will be found to take place in the series of strata, at crossing the Fault in each instance, in this horizontal column, or in Formæ 5^1, 5^2, 5^3, &c.

In like manner, Forma 6 is shewn, as deranged the thickness of 4 strata, and in tracing the series of strata on the surface of Formæ 6^1, 6^2, 6^3, &c. in each case, the same degree of derangement, or an interruption of 4 in the order of the strata will be discernible.

Whence we may conclude, that in all cases of "Rise parallel," the surface will indicate, by the interruption to the series of strata which takes place at the Fault, what is the extent of that rise; in the same manner, as by their being no interruption to the series in Formæ 1, 1^1, 1^2, &c. 2, 2^1, 2^2, &c. we might conclude (as above shewn) that there is no rise or derangement at the Fault, but tilts merely, which suddenly change the direction or ranges of the strata. It is by the sudden and uniform derangements, which the basset-edges of strata suffer at the Faults, that the places of such Faults are discovered, in the Surveying of Districts, where Mining has not proved them under ground.

For example, in Forma 3^4, from tracing the basset-edges or courses of several strata, in the pile a b c d, as Nos. 6, 7, 8, 9, 10, and finding them terminate or abut against other strata at the line F f, I conclude *that there is a Fault in that place;* and which will be further confirmed, by tracing the basset-edges of Nos. 2, 3, 4, 5, 6, in the other pile of strata i k l m, and finding them also to terminate abruptly at the same line F f. And further, by observing carefully, whether the several thin known strata, are found to abut against the Fault at equal distances, in all parts of the series, it may be concluded, *on which side the Fault rises, and whether such rise be parallel,* or the same throughout, or whether it be increasing one way in the quantity of its rise, and decreasing the other; which are things of the first importance to be known, whether by the practical Miner who is about to commence his operations in a Mineral Field, or by the Mineral Surveyor of a district, where such great Faults occur, as to interrupt the regular order of the basset-edges of the strata, in their course through the Country.

It will not be difficult, for any one who has attended to what has been said above, on the surfaces made by "Tilts" without rise, and by the "Rise parallel," to trace out and discover from the appearance of the basset-edges on the surface, the "rise increasing," and the combination of the same with the "Tilts," in Formæ 4^1, 4^2, 4^3, &c. 7^1, 7^2, 7^3, &c. and 8^1, 8^2, 8^3, &c.: and as these details are not absolutely necessary, in my general description of the Derbyshire strata which is to follow, I shall reserve the same for my intended Mineral History;

History; and here only further remark, that the increasing derangement of the basset-edges, at crossing a Fault, indicate the increasing quantity of the rise, and *vice versa*, with as much certainty as their uniformity denotes the absence of any such increase or decrease, as above explained.

Description of the principal STRATA *in Derbyshire and its Environs, as shewn in the Map, Plate* II. *facing page* 97.

I. *Gravelly Soils.*

The first substances which claim our attention in describing the strata, are the *Gravels* and other *Alluvial Matters*[*] (coloured Brown in the Map), as being the uppermost, and occupying indiscriminately the surface of nearly every stratum in the County, in different patches. The principal mass of Gravel within the limits of my Map, is situate in Nottinghamshire, the higher and more barren parts of which are known by the name of Sherwood Forest; it covers the Yellow or Magnesian Limestone strata (coloured Yellow) at its western edge, from Radford, past Annesley, Mansfield, Worksop and Carlton, and thence northward into

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[*] With many modern Writers, the terms *Alluvium* and *Alluvial Strata*, are applied, according to their Theories, to a great part of the strata which compose the British Islands, as already intimated, p. 110, Note; but Mr. William Smith and myself constantly confine the term *Alluvia*, to superficial matters, consisting of or containing or covering, rounded and water-worn stones, or such as evidently have been detached by force from the masses or strata to which they originally belonged; such alluvial matters seldom, or perhaps never, appearing, stratified in the uniform manner peculiar to regular strata, but the beds thereof, when such are discernible, frequently feather-out, or are wedge-like, and intermix with each other.

Yorkshire; and at its southern end; from Nottingham Town, past Arnold, Calverton, &c. the Forest Gravel, appears to cover the Red Marl strata (Lake). In the interior of the Forest, I am inclined however to suspect, that the Gravel covers an immense Fault, and part of the important series of Coal-measures of South Wales, and those which about Dudley in Worcestershire, Walsall in Staffordshire, and S of Congleton in Cheshire, are seen, as upper measures to the yellow Lime. At Nottingham and Mansfield, and at several intermediate points, this Gravel wholly consists of alluvial Sand and highly rounded Quartz and other silicious Pebbles, to the depth of 200 or 300 yards; it is in many parts concreted into a soft Gravel Rock, or Pudding-stone as some call it, and is irregularly stratified. In all my examination of this immense Mass of Gravel, except on the very surface, I did not perceive a single Pebble which belonged to the neighbouring strata, or to any strata which I have seen in England! Near Blidworth there is, as I have been told since I was in that district, a large mass of Alluvium on the surface, belonging to the Red Ground (or Red Marl as I here call it), perhaps similar to the Alluvium on Abberley Hills in Worcestershire, to the N W of the City of Worcester.

From Nottingham towards the SW and then W, a vast train of this quartz Gravel, but in a broken and mixed state, as if it were the ruins of the southern end of the Forest Mass, extends across Derbyshire into Staffordshire, leaving Islands of Red Marl exposed, of very irregular shapes, as shewn in the Map. In some parts, this Gravel is seen occupying the Valleys, more or less mixed with sand and with a few flints and other stones, the produce of the English strata to the S E, and with a few thin and partially rounded fragments of the Derbyshire Mountain Limestones, apparently brought down by the Dove and the Derwent Rivers. Around and to the S of Foremarke, the Valleys to a considerable height are filled with Gravel, and in which a second excavation of narrower Valleys has taken place, particularly in Bretby or Bradby Park. Near the course of the Trent, Derwent, Dove, Soar and other Rivers and principal Brooks in this Gravelly district, an alluvial flat of loam or sandy loam has accumulated upon the Gravel, by the sediments of the Floods which occasionally overflow them, from one to several feet in thickness, generally without the admixture of stones or other heavy bodies. These alluvial Flats, are of considerable width on the banks of the Trent, Dove and Derwent, and produce most excellent Meadows. In other parts of this gravelly district, this foreign Alluvia is as uniformly disposed on the tops and ridges of Hills and on high ground, as in the parts above-mentioned, it is in the Valleys, as the list of Hills which is given in Sect. 1, page 16, and of Gravel Patches which follow, distinctly shew: and it is important to observe, that in some places, where dislocations of the strata or Faults, have occasioned sudden edges or cliffs of the strata, that this foreign quartz Gravel is lodged against such, and has completed the regular form of the surface, as may be seen about Allestry, Muggington, Ashburne, Ramsor, Staff. Measham, Stanton and Newhall, &c. and as is represented by Dr. Millar in *Plate* II. *Fig*. 6, of his 2nd edition of Williams's "Mineral Kingdom," vol. II. p. 572 and 191. In some parts, the Gravel of the Hills as well as the Valleys, is so much mixed with Clay and Marl, as to need Draining, and produces cold and rather poor Lands, particularly on the south of Ashburne and in Needwood Forest in Staffordshire, now recently divided and enclosed. The surface in Derbyshire which is covered by Gravel, and coloured Brown, I find, by a careful scaling of my large Mineral Map, to amount (including the alluvial or river Flats, within the same) to 77,000 acres very nearly, being the 4th Soil in point of extent, in the County.

Besides the above connected tract of Gravel towards the southern parts of the County, there are many small detached hummocks or patches of Gravel, of various kinds, in the other parts of the County and in those which adjoin, which are curious in many respects, but particularly, as proving the important Geological Truth, that Gravel and alluvial matters, are peculiar to no particular sub-stratum, but *are deposited alike on all strata**, and in almost all situations; on which account, I beg to present a list of all such issolated patches of Gravel, as I have noted in my survey of the district contained in the annexed Map.

An Alphabetical List of detached Patches or Hummocks of GRAVEL *not shewn in the Map of Soils, with their Situation, their Nature, and that of the Strata which they cover.*

Abbots Bromley, NW of the Town, in Staffordshire, loamy Quartz Gravel, on Red Marl.

Alderwasley, 1 *m.* S S W, near Miln-hay, sandy Quartz, on 1st Coal-shale and 1st Grit.

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* A late writer on the Wernerian Geognosy, in the article *Fletz*, in Dr. Rees' new Cyclopædia, classes *Gravel and Sand* in Werner's *Fletz Trap Formation*: and this writer asserts, the dogmas of his School, to be as superior, in truth and excellence, to all which others have written on Geology, as the Astronomy of the moderns is to the Astrology of the Ancients! See *Geology* in the work above quoted.

Aldwark, ¼ *m.* W, near Minning Low in Brassington, clayey Chert Rubble, on 4th Lime.

Alport S E, near Greenfield House in Yolgrave, clayey Limestone, Grit, &c. 29 yards deep, on Shale.

Arbor Low. See *Middleton.*

Ash, S E of the Houses, near Etwall, loamy Quartz, Flint, &c. on Red Marl.

Ashby-de-la-Zouch, in Leicestershire, at W end of Town, sandy Quartz, Flint, &c. on Coal-measures.

Ashton-under-line, in Lancashire, 1 *m.* N E, loamy Quartz, on Coal-measures.

Attercliff, N E of the Church, in Yorkshire, clayey, Quartz and other Bolders, on Coal-measures.

Bakewell, ¼ *m.* S. clayey with Limestone Bolders on Shale.

Barrow on Soar, Leicestershire, S E of the Town, Flint, Chalk, Quartz, &c. on Lias Limestone.

Belgrave, N of Leicester, small Quartz, on Red Marl.

Blackwall in Kirk Ireton, N and SW of Farm, sandy Quartz, on Shale.

Blackwell, S W, near Chelmerton, clayey, Limestone, Toadstone, &c. on 3rd Lime.

Bladon Hill, S W of Newton Solney, Lias and other Limestones, Flint, Quartz, &c. &c. on Red Marl.

Bolsover, 1 *m.* E N E, very sandy Quartz, on yellow Lime.

Boothorp Village, N of Ashby Wolds, Leicestershire, sandy Quartz, on Coal-measures.

Brailsford in and N of the Town, and ½ *m.* S, Quartz, on Red Marl.

Brassington, ½ *m.* S, very clayey with Lime and Grit Bolders, on Shale.

Bredsall, S and S E (at Frickley) and N N W of the Town, sandy Quartz, on Coal-measures.

Bretby or Bradby Park, S E side, clayey, Lime, Granite and other Bolders, on Coal-measures ? and E and S E of the Village, in Vales of Red Marl.

Brislingcote Hall S, near Stanton, Quartz on Coal-measures ?

Calke, E and N E of the Church, quartz Gravel-Rock, on yellow Lime.

Callenge Low S E, in Yolgrave, clayey Chert Rubble, on 1st Lime.

Car-meadow, N of Hayfield, clayey with Granite and other Bolders, on 1st Coal-shale.

Castle Gresley Town and S E of it, Quartz, on Coal-measures ?

Cellar Head Inn, near Dilhorn, Staffordshire, Quartz, on Marl and Limestone beds.

Chaddesden, N E of the Town (on the Moor), clayey, Quartz, Limestone, &c. on Red Marl, and on Coal-measures.

Charlesworth N, and S W, in Glossop, clayey with Granite and other Bolders, on 3rd Grit and 2nd Coal-shale.

Chellaston, E and S E of the Town, clayey, Flints, Quartz, Lime, &c. on Red Marl and Gypsum.

Chisworth N, in Glossop, clayey with Granite and other Bolders, on 2nd Coal-shale.

Cinder Hill, ½ *m*. S. near Basford in Nottinghamshire, Quartz, on yellow Lime.

Coton, S and S E of the Town, and N W of it, Quartz, on Red Marl.

Crich Lime-Quarries, S W of the Town, Clay and Quartz, on 1st Lime.

Cross o' th' Hands, near Turnditch, sandy small Quartz, on Shale.

Cubley, ¼ *m.* E, and S E of the Town near Bentley Hall, Quartz, on Red Marl.

Dale Abbey, S and W. of the Town (to Dums Hill), very sandy Quartz and Gravel Rock, on Coal-measures.

Dethick, ½ *m.* NW near Matlock, very clayey with Lime Bolders, on 1st Coal-shale.

Dinting, S, in Glossop, clayey with Granite and large Silicious Bolders, on 2nd Grit and 2nd Coal-shale.

Dirtlow Moor, 1½ *m.* W of Bakewell, clayey Chert Rubble, on Rottenstone and Shale-Limestone.

Disworth in Leicestershire, ¼ *m.* N W of the Town, Lias and other Lime Bolders, Flint, Quartz, &c. &c. on Red Marl.

Duffield, S E and N W of Meadow Houses (on the New Wirksworth Road), Quartz, on Shale.

Edale Chapel, S E, near Castleton, clayey with Lime Bolders, on Shale.

Elmton, ¼ *m.* N E, sandy Quartz, on yellow Lime.

Gatcham near Wetton, Staffordshire, clayey, Grit-stone, Crow-stone, Gravel-Rock, Quartz, &c. on 4th Lime.

Glossop, W, clayey with Granite and other Bolders, on 1st Grit and Coal-shale.

Griffe Pastures near Hopton (at Chariot Clump), loamy Quartz, Chert Rubble, Gravel-rock Bolders, &c. on 3rd Toadstone.

Haddon Hall, ⅓ *m.* W, near Bakewell, clayey with Chert Rubble, on 1st Lime.

Hadfield, N, in Glossop, clayey with Granite and other Bolders, on 1st Coal-shale.

Harlaston, ½ *m.* N W of Town in Staffordshire, loamy Quartz, on Red Marl.

Hartshorn, ⅓ *m.* N E, sandy, Flint, Chalk, Quartz, Granite, Grit, Limestone, &c. on Coal-measures.

Hayfield, 2 *m.* S E, E of Kinder Houses, Gravel-rock Bolders, on Shale.

Heanor, S E of the Town, sandy Quartz, on Coal-measures; and more S, clayey, Flint, Chalk, &c. 20 yards deep, on Coal-measures.

Heather, S E of the Town, in Leicestershire, Quartz, on Coal-measures.

Hopping-hill E, near Belper, Limestone, Grit, Chert, Quartz, &c. on 1st Grit.

Hoppus, 2 *m.* N W of Tamworth in Staffordshire, Quartz, on Red Marl.

Horsley, N E of the Town, Quartz, on Coal-measures.

Hulland Ward, S of the Houses, Derby Hill, a long Ridge of Quartz; and N E of the Houses, a small patch, on Shale.

Hurric, N of the Village, in Horton, Staffordshire, gravel Rock on 1st Grit, S W of Rudyard Reservoir.

Hyde-Chapel, W and N W of the Town, in Cheshire, Sandy Quartz, on Coal-measures.

Ireton-wood, in Kirk Ireton, N near Cliff Ash; and S near Bull Hill, Quartz, on Shale.

Isley Walton, in Leicestershire, in and W of the Town, Quartz, on Red Marl.

Jow-hole Furnace, E of Disley, Cheshire, Granite, Quartz, and other Bolders, on 3rd Grit.

Kedleston, N of the Hall and Park, Quartz, on Red Marl.

Kilburne, E of the Village, near Horsley, Quartz, on Coal-measures.

Kirk-Ireton, ¼ *m*. S, Quartz, on Shale.

Kniveton, at W end of the Town, sandy Quartz, Grit, and Limestone, on Shale-Limestone.

Linton, N end of the Village, Gravel Rock, on Red Marl.

Littleover Town, Quartz, Flints, &c. on Red Marl.

Locko, S and W of the Hall, clayey Quartz, Limestone, Bloodstones, &c. on Red Marl and Coal-measures; and E (to Dums Hill), sandy Quartz, on Coal-measures.

Ludworth, in Glossop, clayey, with Granite and other Bolders, on 2nd Coal-shale.

Lullington Town, and small patches S and SW, and another 1¼ *m*. SW, loamy Quartz, on Red Marl.

Macclesfield Common, E of the Town, in Cheshire, clayey, with Granite and other Bolders, on 2nd Coal-shale.

Markeaton, NW of the Village, near Kedleston, small Quartz, on Red Marl.

Marple-bridge, N, in Glossop, clayey, with Granite and other Bolders, on 2nd Coal-shale.

Marston Montgomery Town, Gravel Rock; and 1 *m*. W, near Haven House and Quickhill, Quartz, Grit, Lime, &c. on Red Marl.

Measham Town, Gravel Rock; and S E, sandy Quartz, on Coal-measures.

Middleton by Yolgrave 1¾ *m*., NW of Arbor Low, clayey, Chert Rubble, on 2nd Lime.

Midway-houses, and E and S E of them, near Hartshorn, Quartz, on Coal-measures.

Monyash, 1¼ *m*. N on the Buxton Road, near High Low, clayey, Chert Rubble, on 1st Toadstone; ¾ *m*. E of the Town, at Dunnage Meer, clayey, Chert, on 1st Limestone; and 1½ *m.* N E, at Hunter's Meer, clayey Chert, on 1st Lime.

Morley Town, Quartz, Gravel Rock, on Coal-measures.

Mount Sorrel, W of the Town, in Leicestershire, Quartz, Flint, Chalk, &c. on Sienite.

Muggington, ½ *m.* S of the Town, Quartz, on Coal-measures?

New Haven, 1 *m.* S S E, in Hartington, clayey Chert, &c. on 4th Lime.

Over Haddon, 1 *m.* NW (round Stanlow), clayey, Chert Rubble, on 1st Lime; and ½ *m.* E, clayey, Chert, Toadstone, &c. on 1st Lime.

Over Seal, 1 *m.* N, in Leicestershire, Quartz, on Coal-measures?

Packington, at SW end of the Town, in Leicestershire, Quartz, Flint, Bloodstones, &c. on Coal-measures.

Pickerings Wood, 1 *m.* S E of Witwick, in Leicestershire, Quartz, on Red Marl.

Ravenstone Town, Quartz, on Coal-measures?

Ripley Windmill-hill, S E of the Village, near Codnor, very sandy Quartz, on Coal-measures.

Risley, ¼ *m.* W of the Town (Golden Hill), Quartz, a Ludus-helmontia, on Red Marl.

Rosleston Town, and S of it, loamy Quartz, on Red Marl.

Rothley, NW of the Town, in Leicestershire, sandy Quartz, on Red Marl.

Rushton Marsh, N E of Rushton Spencer, in Cheshire, Quartz, Gravel Rock, on Shale.

Sheepston Hill, on Rushy Smeethe, near Annesley, in Nottinghamshire, sandy Quartz, on Coal-measures.

Sheffield, Yorkshire, ¼ *m.* NW, at Philadelphia, very clayey, Grit, Crowstone, &c. on 4th Coal-shale.

Sheldon S, at Hunter's Meer, clayey, Chert, Quartz, on 1st Lime.

Smithsby Common, N of the Town, clayey, Quartz, Flint, &c. on Red Clay.

Sookholm Village, and S W and N E of it, near Church-Warsop, Notts, Quartz, on yellow Lime.

Spondon, N and N E of the Town, clayey, Quartz, Limestone, &c. on Red Marl.

Stanton, ¼ *m.* N W, near Bakewell, clayey, with large Lime Bolders, on Shale.

Strelley, Nottinghamshire, ½ *m.* S of the Church, very sandy Quartz, on yellow Lime and Coal-measures.

Swithamley, SW of the Hall, near Rushton Spencer, Staffordshire, very clayey, with Granite and other Bolders, on Shale.

Tansley S, near Matlock, very clayey, with Lime Bolders, on 1st Coal-shale.

Thorney Ley, WSW of Chapel-en-le-Frith, Quartz, on 1st Grit.

Thorpe Salvin, Yorkshire, ¼ *m.* N E of the Church, very sandy Quartz, on yellow Lime.

Tideswell, 1¼ *m.* N N E, clayey, with Chert Rubble, on 2nd Toadstone and 3rd Lime.

Tissington, ¼ *m.* S E, very clayey, with Lime Bolders, &c. on Shale-Limestone.

Trowel Heath, S E of the Town, in Nottinghamshire, sandy Quartz, on Coal-measures.

Turnditch, S of the Town (Flowry Hill), sandy Quartz, on Shale; and more S, clayey Quartz, &c. on Shale-Limestone.

Walker Barn, E of Macclesfield, in Cheshire, Quartz, Grit, &c. on Coal-measures.

Watnall, W of the Town (Cliff Hill), in Nottinghamshire, Quartz, on yellow Lime.

Wensley, N of the Village, near Winster, clayey, with Lime, Grit, Quartz, &c. on Shale.

Weston-Underwood Village, and N E of it, sandy and small Quartz, on Red Marl.

Whaley Bridge, N of the Houses, in Cheshire, sandy Quartz, on 2nd Coal-shale.

Whitwell, N E of the Town (near Red Hill), sandy Quartz, on yellow Lime.

Wooley Bridge, W of Glossop, clayey, Granite, Quartz, and other Bolders, on 2nd Coal-shale.

In the above List, I have not included the more considerable issolated patches of quartz Gravel, which are shewn in the Map, on the W of Mansfield in Nottinghamshire, on the N of Over Seal in Leicestershire, and around Cheadle and around Leek in Staffordshire; or the edges of larger tracts near Congleton, and near Macclesfield, in Cheshire, which are also introduced.

The alluvial Flats, or Meadow Lands by the sides of all the Rivers and Brooks, belong to the Alluvia, but could not be represented on so small a Map, without creating confusion, particularly by breaking the connection of the tracts of similar Strata, which this Map is principally intended to shew.

I use the word *Gravel*, to express every kind of Alluvia with rounded stones; if such a proportion of pebbles exist in it as is usual in Gravel-Pits worked for the Roads, the simple term alone is sometimes used; if the stones much or very much abound, I call it clean or very clean Gravel; if the earthy or loose matters in the Gravel are of a sandy nature, and filter water readily, such is called either clean sandy, sandy, or very sandy Gravel, according as the pebble stones are more or less abundant; if the loose matters are a mixture of Sand

and Clay, or other earth, and filter water but imperfectly, such is either called clean loamy, loamy, or very loamy Gravel: if, on the other hand, Clay so abounds in Gravel, that water cannot filter through it, and it is difficult to separate the pebbles from the dirt, I call such either clean clayey, clayey, or very clayey Gravel, according to the greater or less proportion of stones in the mass. According as Quartz, Flint, Gritstone, Limestone, Toadstone, Crow-stone, &c. abound or are mixed in Gravel, it is denominated Quartz, Flint, Grit, Limestone, Toadstone, Crow-stone, &c. Gravel.

I have before observed, that Rounded stones are essential to Gravel: in many instances the stones in alluvial mixtures are angular, like Gun-flints almost in shape, as happens frequently with the white Cherts in alluvia on the Limestone strata; or they are like the larger chippings of a stone-mason's yard, or the small and loosened stones which are found on the top of most stone-quarries, and called Ratchel, Rumel, Keale, Skerry, or *Rubble*, by which last name I denominate all such loose and angular stones in mixed soils, if of small size; but if large, such are called Bolders, if rounded by attrition; or, *Self-stones*, if possessing still the original shape and angles of the block: many instances of Bolders, or rounded stones, very extraneous to the strata on which they rest, occur in the above List, and other instances of curious single Bolders will be given in my Mineral History. Until cultivation had proceeded to its present extent in these districts, the instances were numerous, of large tracts being covered with loose blocks or self-stones, principally of gritstone in the districts coloured Purple in the Map, and of Limestone in the districts coloured Vermillion and Orange: but such have now in a great measure disappeared,

peared, having been broken up and converted to Lime, or used in the Wall-Fences and Buildings, or in draining, &c.; except that here and there, a few of such blocks are to be seen on Commons, or in particular Fields which have not yet been cleared; some, because they will not answer the expense of such clearing, or *Ridding*, as it is more generally called.

Some of the tops of Hills in the List in Section I. page 16, still remain covered with loose blocks of their native Rock, as Bradgate Park W (of Sienite), Brassington Pastures (Hoe Cliff, Reynards Tor, &c. 4th Lime), Cliff Hill, near Pilsbury (4th Lime), Elk Low (4th Lime), Harboro Rocks (3rd Toadstone or Dunstone), High Lees (1st Grit), High-Roches (1st Grit), Ipstone-edge (1st Grit), Markfield Windmill-hill (Sienite), Masson, E side (2nd Lime), Moot-low (4th Lime), Mount Sorrel Common (Sienite*), Ox Stones 2nd Grit ?), Revedge (1st Grit), Sheen Hill (1st Grit), Stanton Moor (1st Grit), &c.

And some of the narrow Valleys in the List in the same Section, p. 64, have their bottoms still covered by large Self-stones, as Barbrook (of 1st Grit), Devil's Bowling-alley (1st Grit), Mill-dale, in Staffordshire (4th Lime), &c. But the more common situations of large quantities of great Self-stones remaining on the surface, within the district of our Map, is, on the sides of hills, or the slopes of large valleys which have Cliffs of stone in their upper edges: as in Ashover, S E and W of the Town (of 1st Grit), Bamford, E N E of the Village, in Hathersage (1st Grit), Cromford, S and S E (1st Grit);

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* Some of these Blocks might be mistaken at first sight for Bolders, but their rounded tops seem, not owing to attrition or mechanical violence. See the Philosophical Magazine, vol. 35, page 260.

Hathersage, 1¼ *m.* SSW, under Old-booth edge, and 1½ *m.* NNW, under Stanage (1st Grit), Oughty Bridge, SW, in Yorkshire (1st Grit), Tor-side S, in Glossop (1st Grit), Wadsley NW, in Yorkshire (3rd Grit), &c. &c. By examining the Fence-Walls, in districts where Self-stones formerly abounded, their remains can generally be distinguished, and their nature detected; which observations, if carefully and extensively made, would tend to throw light on the very curious and astonishing circumstances, of the distribution formerly, of Self-stones on the surface.

I shall detain my reader with the mention of but one other class of alluvial substances, and that is, the *Slither*, or indestructible rubble of Limestone, generally in rather thin and sharp angled chippings, of white and light grey or yellowish Limestone, which are lodged on the steep sides of Valleys in several instances, particularly the E side of Hay Dale, in Great Longson, in Monsal Dale, and in Dove Dale, where the spaces thus occupied are considerable; as also on the southern slope of Bunster Hill, at the S end of the last mentioned valley. I also noticed this Slither in Bradford Dale, Callenge Dale, Cresbrook Dale, Lathkil Dale, and Wye Dale; in the latter, very curiously concealing the basset of the 3rd Toadstone, opposite to Chee Tor in Wormhill. The patches of Slither mentioned above, are in general, the most barren spots that can be imagined, not a blade of grass, a weed, or even a Lichen, having got possession of them, nor do they exhibit the least signs of decomposition or mouldering, by which soil might be accumulated. In general, this indestructible rubble lays on so steep an ascent, that it slips from beneath the feet of an animal which attempts to cross it, whence the name Slither, or sliding gravel.

2. *Lias Clay and Limestone Strata.*

These are coloured Blue, and have been already described, page 114, sufficiently for our present purpose, since they form no part of the Derbyshire Strata.

3. *Red Marl Strata.*

The uppermost regular Stratum (for the Gravels above described are not regular Strata) which appears in Derbyshire, I denominate the Red Marl (already mentioned at page 115); it is coloured Lake Red on the Map, and occupies most of its southern end, in Nottinghamshire, Leicestershire, Warwickshire, and Staffordshire, as well as Derbyshire; it is bounded on the North by, perhaps, the greatest *Fault*, or derangement of the strata, which has yet been investigated or described; for the sake of distinction, I call this the *Great Derbyshire Fault:* it is shewn on the Map by a full or unbroken line, commencing near Colwich, in Nottinghamshire, and proceeding W a little N of Stapleford and Sandiacre, where it crosses the Erewash, and enters Derbyshire, and crossing it, near to Stanton, Bredsall, Allestry, Quarndon, Bradley, and Ashburne, it crosses the Dove, and enters Staffordshire; skirts the Weaver Hills, between Wooton and Ramsor, and thence continues on the S side of Cheadle and Newcastle-under-line; when turning nearly at right angles, it proceeds about N N E, until having entered Cheshire, and left Congleton on the W, it crosses the Dane near Northrode, and continues on to the E of Macclesfield, and there leaves the field of my present enquiries. For several Miles of its course on the South and West of the Coal district, or Pottery Coal-Field, around Newcastle-castle-under-line, I have not myself attempted to trace this great Fault; but the testimony of Mr. Wm. Smith, and several other intelligent friends, who have travelled repeatedly over this tract, leaves me no room to doubt, that the great and nearly horizontal plane of Red Marl, which I have traced and described westward, as far as a dotted line on my Map, from Tamworth, past Yoxall and Kingston to near Alveton, continues forward without interruption, except from Gravel-beds upon it, or perhaps some occasional patches of Coal-measures thrown up from beneath it, and denudated (as will be explained further on), until having passed the angle or turn in the great Derbyshire Fault, above described, the Marl proceeds also to the NW and N, over all the middle parts of Cheshire; producing there, the highly valuable beds of Rock Salt, and the Brine Springs, and Gypsums, which Mr. Henry Holland has so well described in the Cheshire Report, pages 19 to 73.

In order to satisfy myself further, on the identity of the Cheshire Red Marl, with that in Derbyshire, I made an excursion, and examined the neighbourhood of Congleton, and one of the Salt-works, with Gypsum in the Red Marl strata above the Salt Rock (at Church Lawton), which Mr. Holland has described: and discovering near there, the great Fault above mentioned, where it enters Cheshire, I traced the same northward through Astbury, Bug-Norton, &c. to near Macclesfield, as shewn in the Map, and as will be more particularly described further on. It accords perfectly, with the fact of the vast extension of this Red Marl stratum on the surface, that it is in almost all parts very nearly horizontal. In all my numerous observations upon it, I found but two places within the limits of my great Map, where it had a considerable dip, and this only in small

patches,

patches, viz. on the W of Donkil-Pits Farm in Catton, where the dip was E, and on the N E of Congleton, in Cheshire, near to the great Fault, where it dips rather rapidly to the W: in two other instances I observed it dipping in a less degree, viz. to the N, on the south side of Burton Bridge, and ½ *m.* NW of Stretton-en-le-Fields, where it dips easily to the SW.

It is a remark which I have heard from several experienced Land-Surveyors, that the best tracts of Land which they have any-where met with in the course of their practice, have been upon this stratum: and I think I shall not be much wide of the mark in saying, that the best Land which I saw in or near Derbyshire, was on the Red Marl, about Barton-Blount and Ash, Rolleston-Park, in Staffordshire, &c. In general, however, the Derbyshire Red Marl is inclined to be too tenacious and cold, and in some parts would pay amply for Draining. Marling was very extensively practised upon it at a former period, as the large ancient Pits testify; but at present it is practised but in very few places, as will be further noticed in Sect. 3, of Chap. XII. Bricks and tiles are made in great quantities, from the more tenacious parts of this stratum. See the next Section.

The surface of the Red Marl is much furrowed into Vales and Hills, and thus presents, in numerous places, the bassets of fine-grained micaceous *grit-stone* beds of considerable thickness, some of which produce good Freestone Quarries, as will appear by consulting the general list of Freestone Quarries in Sect. 5. In some few instances, these silicious beds are not concreted, but appear as *Sand*, particularly at Normanton, S of Derby, where it is very white; at Steeping Lane, 1 *m.* W of Derby; and at Radburne Common, &c. To the northward of Black-brook Reservoir, on Charnwood Forest, in Leicestershire, there is a large mass of Red and Yellow Sand, which apparently belongs to the Red Marl.

It frequently happens, that the Red Marl is interlaid with streaks or thin beds of light blue or greenish blue Earth, or Marl, and often in Nottinghamshire (see Mr. R. Lowe's Report, p. 5), and elsewhere, these are of a stoney hardness: in Derbyshire, however, these blue *Marl-stones* are rather scarce; I only noticed them at Allestry S, Bredsall S, and Littleover.

Gypsum, or Alabaster, is a produce of this Red Marl, in which it forms thin beds or strata in particular spots, sometimes finely striated transversely to the strata, in other parts the Gypsum is accumulated in vast nodules, or irregular and confused crystals, forming hills, where the covering of Marl has been stript off: part of Chellaston Hill, in particular, would present a naked and water-worn rock of Gypsum, were it not for the Alluvial Clay which covers it, as already observed, p. 26 and 136. On the S E side of Chellaston Town are four Gypsum Pits now in work, three of them covered by alluvial Clay, in occupation of Mr. Robert Wright, Mr. Gilbert Hutchinson, and Mr. George Wooton, who also occupies the most southwesterly Pit, where the stratified Red Marl is removed, to come at the Gypsum, Alabaster, or Plaster-stone beds.

The principal demand for the pure white Gypsum, or that slightly streaked with red, is by the Potters in Staffordshire, who form their Moulds of Plaster of Paris made from these; it is called here Potters' stone, and sells at 9*s.* per long Ton (20 × 120lb.), and is carted about a mile and half to Cuttle-bridge Wharf, on the Trent and Mersey Canal, whence it can be conveyed to any part of the kingdom. In the working of the Potters' stone, some particular fine blocks are selected, and sold at 20*s*. per Ton, to the Turners and makers of Alabaster Ornaments. The inferior sort, which is streaked, and mixed with blue and green earth, is called Flooring-stone, and sold at 7*s*. per Ton, for making of plaster Floors, of which I shall say more in Sect. 2 of Chap. III. A quantity of very white, striated, or fibrous Gypsum is dug in these pits, in thin beds, and called Joists, which they sell at 2*s*. a Cart Load, for building Walls, making Paths, and others of the commonest purposes, conceiving it to be inferior to the other kinds, but for which supposition I could discover no foundation. Mr. George Wooton has lately erected a kiln at Skelton-Leys Wharf, on the Derby Canal, 2 *m*. distant from the Pits, where Plaster is prepared and sold, ready for Floors or for Plasterers' uses, &c.; and Messrs. Brown and Co. of St. Alkmund's, in Derby, have also Kilns, &c. for preparing Plaster of Paris.

About ¾ *m*. N of Aston, Mr. Samuel Storey has a Pit in work, and formerly there were others in Ballington Hill, S of Ambaston; which are the only three places in Derbyshire where Gypsum has been dug, to my knowledge, notwithstanding the large surface which the Red Marl makes in the County; owing, it should seem, to the Gypsum only occurring in particular patches or nodules, and there often occasioning a hump or issolated hill, by the additional thickness which it gave to the Marl in such places. In the Well of the Turnpike-House at Two-Mile Ash, in Darley-Abbey near Derby, and in a trial for Coals at Risley Park, S E of Dale-Abbey, some years ago, it is said that Gypsum beds were discovered.

At the Red-Hill in Ratcliff, at the junction of the

Soar and Trent in Nottinghamshire, are Gypsum Pits, and Kilns for burning it and preparing Plaster, which is sold on the spot by Mr. William Acton the occupier, at 1*s*. per bushel: Red Marl here covers the Gypsum beds, as it does also at Clifton Pits S E of this, and at Newark in the same County. At Syston, N N E of Leicester, a coarse kind of Gypsum is dug and prepared for plaster Floors, and also 1 *m*. S of Leicester, as I have been informed, though Mr. Pitt, (Leicestershire Report, p. 9) seems not to have been apprised of these Pits. Several Wells on the E side of Leicester have reached Gypsum beds in the Marl, under the Gravel, on which that Town stands.

Gypsum appears at several places in the parts of Staffordshire which I have examined and included in my Map. At Fauld-Hill, 1 *m*. N E of Hanbury, it is dug in considerable quantities, under 8 or 9 yards of Red Marl, and sold at 10*s*. to 12*s*. per ton, according to its whiteness and purity: at Castle-Hay, 1 *m*. N W of Tutbury; at Row-Bank, N E of Coton, and also S W of it, near Hanbury; formerly, at Hound-Hill ¼ *m*. S E of Marchington, and at Horninglow near Burton, it has been or is dug; also, in Mr. Harper's new Well on Needwood Forest, ¼ *m*. S W of Hanbury, Gypsum beds were passed through, as I have been informed.

Sienite, or the Granite of Mr. Playfair and some other Authors, next claims our notice as a produce of the Red Marl strata, within the limits of my Map, viz. in a tract to the west of Mount Sorrel Town in Leicestershire, which is distinguished by dotted lines, and in another tract around Newton-Linford, Markfield, and thence to Grooby, at the south end of Charnwood Forest. The reasons that I have not coloured this extraordinary and anomalous produce of the Red Marl, so as to distinguish it therefrom are, that it is only on the very tops of Hills that the Sienite appears, piercing through the Red Marl in such places, except in the Town of Mount Sorrel, where the excavation of the Vale of Soar has removed the flank of Red Marl, which every where but in similarly excavated places, I found enveloping the base of the Sienite, except where it is adjoined by or intermixed with similarly anomalous masses of coarse Slate, as in the tract at the south of Charnwood Forest above mentioned. In the list of Hills in Section I (p. 16), of this Chapter, most if not all of the peaks of Sienite in these tracts are particularised, and need not here be repeated: I would just however observe, that the Turnpike Road from Leicester to Ashby-de-la-Zouch passes through the Grooby Quarry, and presents to Travellers an opportunity, equally or more favourable than Mount Sorrel, for examining the nature of this Rock: for which there is an extensive and increasing demand, for the paving of Streets, similar to the carriage-ways in London, and when broken small, for repairing Roads, instead of gravel. At Croft, Earl-Shilton and Stoney-Stanton, on the S W of Leicester, other patches, huge nodules, or rather perhaps, confusedly crystalized masses of Sienite appear, in the Red Marl, as I have been informed; and others near Wolverhampton: the Sienite of the Malvern Hills, and of the north-eastern part of Devonshire, belong probably also, to the same part of the British series of Strata.

Slate, of a very dark blue and of various grey and greenish tints, is also a production of the Red Marl stratum, which I am describing: it appears in small low peaks, piercing through the Marl, as has been described respecting Sienite, over the whole of Charnwood Forest, except at its southern end, where there are large sienitic masses intermixed with it, as above mentioned: like the Sienite, these Schistous Masses, appear as nodules, or huge rude crystals in the Red Marl, and often adjoin close to the Sienite, without any order of super-position, but they seem placed side by side. As this is a point of some importance in a Geological view, I have noted the following, as places where I observed the Sienite and coarse Slate thus in close contact, viz. in the hill E of Newton-Linford Town, the separation commencing or passing near to the Stag's-Head public-house, and proceeding about N E for a considerable distance into Bradgate Park; Sienite occupying the south side, and coarse Slate the north side of this line of separation. On the SW of Steward's-hay Wood, about 1¼ *m.* from Markfield Toll-Bar, or 1¾ *m.* from Grooby, an abrupt transition from Slate to Sienite *in the same hill*, is observable; while many of the Slate peaks, are but a short distance from others of Sienite, as Markfield Toll Bar Hill from the Windmill-hill; Grooby Hill from others NW of it, &c. By a reference to the List of Hills and Map in Sect. 1, these alterations of Slate and Sienite Peaks, will be more fully seen; as also, in the Philosophical Magazine, vol. 37, p. 163.

Near the W end of the Village of Swithland, or Sweedland as it is vulgarly called, are two immense open Slate Quarries, whence the Country for many miles round is supplied with Roof-slates, with Grave-stones, Mile-stones, Paving, &c.; and of which slate, vessels are constructed, for salting of Meat and for setting of Milk in Dairies, for which last purpose this stone is well adapted, on account of its resistance to greasy or oily bodies; owing to which, they are more easily kept clean and sweet, than even Lead: but this property renders the Swithland Slate very unfit for Mile-stones or other things which are to be painted, because the oil not entering the stone, the paint soon falls off, and leaves the stone as black as at first. One or both of these Quarries are worked by Mr. Henry Hind, who, or his ancestors, had other large Pits in the Wood about 1 *m*. SW from Swithland, which are now disused.

The largest of the Swithland Quarries, crosses a ridge of Slate which stands up above the surface, and is so deep, that at each end 50 to 60 feet thick of Red Marl is removed, to come at the Slate, which seems to improve in quality under the Marl; which Marl here, as in many other parts, has beds in it of light blue or grey indurated Marl, and is very regularly stratified, almost horizontally.

The surface of the Slate at all these Quarries is much shattered, decayed and discoloured, and by decomposing unequally, has the appearance of being a compound mass, like the Sienite almost in structure; the same appearances prevail over all the Forest, and in some places, owing to its assuming different colours in decaying, it has much the appearance of the Sienite, particularly on the flanks of Bardon Hill: it is in allusion to these appearances on the peaks of the Hills, that I call them *coarse Slate* (rather than risk any of the German names, Greenstone, Hornstone-schistus, Trap Formation, &c.), but I am strongly of opinion, that Slate as good for use as that at Swithland, might be got, at equal depths or perhaps less, below most of the coarse Slate Peaks; in situations more eligible by far, for Roads and a Market for the Slate, than the Swithland Quarries have. Now that the Forest is on the point of being divided and enclosed, without doubt this object will be attended to.

I could discover no marks of stratification in either the Sienite[*] or the Slate of these districts, it is the *stratula*, or Folia, or what the Masons call the beat or grain of the stone, which here determines its fracture into blocks or slates, and not the lamina of its stratification, as is evident by the sudden changes which the planes of these stratula take, in all imaginable directions, particularly near the tops of the peaks of coarse Slate, where partial decomposition and exposure enables the tracing of them.

Besides Salt, Brick-clay, Grit-stone, Sand, Gypsum, Sienite and Slate, which have been mentioned as the produce' of, or as being imbedded in the Red Marl, I have been induced, by the situation and circumstances of the large Basaltic Hills between Rowley and Dudley in Staffordshire, to suspect that they also belong to the anomalous masses of this stratum; and the Basalt of Griff and Marston in Warwickshire, &c. From an examination of Sir Francis Burdett's Lime Quarry at the E end of Ticknall, I was induced at first to consider the *Limestone* strata there, as laying immediately under 14 yards or more of the Red Marl; but since examining the Coal District to the south of this, and observing several instances of Red Binds, Clunches, and Potters' Clays, which as nearly approach the Red Marl in first appearances, I have been induced to alter this opinion; in which I am further confirmed, by the great similarity in the appearance, of a thick red Clay stratum, in the Coal Series to the SW of Abberley in Worcestershire, to the Red Marl E of there. On the E and

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[*] I am aware that Professor Playfair is reported to have found stratified Granite in Charley Forest in Leicestershire, and particularly near Mount Sorrel, where he is said to have seen beds of Granite holding the same direction with that of the "*subjacent* Hornstone Schistus."

N E sides of Brecon in South Wales, Limestone beds occur in the Red Marl, in form and manner of laying, exactly resembling the Gypsum beds.

In three places on Sherwood Forest in Nottinghamshire, the Gravel is wanting, and shews small detached patches of Red Marl, which are not shewn in the Map, to avoid confusion, viz. 1 *m.* E S E of Basford, 1¾ *m.* N E of Sutton, and ¼ *m.* N. of Blidworth. In Derbyshire, the Red Marl occupies about 81,000 acres of the surface, being the third soil in point of extent in the county.

4. *Yellow Limestone Strata.*

The Yellow or Magnesian Limestone Strata (coloured Yellow in the Map) come next in order to be mentioned: these emerge from under the Sherwood Forest Gravel, from Radford to Carlton in Nottinghamshire, as already mentioned, page 131; and from Radford, past Strelly, Greasley, Kirkby, Dirty-Hucknall, Hardwick-Hall, Bolsover, Barlborough, South Anston, Laughton-le-Morthen, Maltby and Conisborough; they cover an immense series of Coal-measures (coloured Green), the uppermost of which (except for a short distance on the SW of South Anston, as will be explained further on) basset and appear from under the yellow Lime, through all this long line of places, and onwards towards the North, still further into Yorkshire, near to Barnbrough, Hickleton, Hutton-Pagnal, Elmsal, Badsworth, Pontefract, Knottingly, Brotherton, Kippax, Church-Garforth, Abberford, Bramham, Wetherby, &c. as I have been informed; and to the eastward of which line of places, no Coals have yet been discovered and worked; perhaps owing, to the Dudley series of Coals above the yellow Lime, being lost at a great Fault covered by Alluvia, as mentioned page 132.

These strata of yellow Lime preserve a remarkably regular plane, having an easy dip to the Eastward, and are of very considerable thickness altogether[*]; their general colour is yellow, often as bright as Gambouge, with almost all intermediate shades, to very light straw, and white. Many of the beds have a granular texture, and a brown or reddish hue, particularly near the joints; and from not at all, or but slightly, effervescing with acids in some cases, where the magnesia most abounds, such granular beds have very generally passed for Grit-stone: indeed a considerable portion of the superficial beds of this district, are not denominated Limestone by the inhabitants, nor are they found capable of calcination: at Dudley, Walsall, and other distant places where these strata appear, they are called Clunch, Mudstone, &c. and perish on exposure.

Towards the bottom of this series, several beds of compact *blue Limestone*, imbedded in blue Clay, and abounding with Anomia and other shells, some of them, have been discovered to differ entirely in their properties from the yellow or red beds, and to be much more proper for agricultural purposes, particularly on the yellow Limestone Lands. Quarries of this sort seem to have been long known at Stoney-Houghton near Plesley, at Bolsover, Palterton, and a very few other places; of late years, a quarry of the blue Lime in the yellow, was opened at Knitaker in Barlborough, by Mr. Edward Scolefield, which has a great sale for agricultural purposes. The knowledge of these blue beds of Stone, and that Coals can in every instance be procured from beneath them, to burn them into valuable Lime, along the whole line of Country from Strelly to Wetherby, which I have mentioned, cannot fail ere long, I hope, of proving a source of great benefit to the owners of the Quarries, and to the agriculture of a wide district on each side of them: see the subject of Liming, in Sect. 3 of Chap. XII.

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[*] The statement which Dr. James Millar has lately published (2nd edit. of Williams's "Mineral Kingdom," vol. II. p. 181) of the thickness of these strata, is but *one tenth* of that stated by the late Rev. John Michell to Mr. Smeeton (see Philosophical Magazine, vol. 36, p. 108), viz. 100 yards, and which I think to be below rather than above the truth.

The extended surface of Red Marl which I have mentioned above, as occupying almost all the southern part of Derbyshire, &c. and the Gravel coverings, prevent the tracing of the yellow Limestone strata in connection, further south than Radford and Strelly, near Nottingham: they seem however to make their appearance again, by denudation, at the N E and N border of the Ashby-de-la-Zouch Coal district (Green), thro' a line of detached Limestone Hills, at Grace Dieu (close to, and apparently almost underlaying, the Slate of Charnwood Forest in the Red Marl), Osgathorp Village, Barrow Hill, Clouds Hill, Breedon Hill, and Stanton Park, in Leicestershire, and at Calke and Ticknall, in Derbyshire, where they contain Entrochi. And from numerous circumstances, I am inclined to believe, that the flat blue beds, such as appear at Grace Dieu, Osgathorp, Stanton, Calke, and Ticknall, have a regular continuance from Grace Dieu to Decoy Wood, ½ *m.* S SW of Bretby Church, as upper measures to all the Coal-measures S of them. The rearing or almost vertical yellow Limestone strata, composing Breedon Hill, Clouds Hill, and Barrow Hill, I am inclined not to consider as the effects of Faults or dislocations of the strata, but as contortions or original humps, to which these strata were liable, in particular places, at the time of their formation; since exactly similar rearing measures are to be seen at Wild Park, in Derbyshire, in a long chain of Hills near Abberley, in Worcestershire, and in others stretching from Wolverhampton to Dudley in Staffordshire, where, at Wrens'-nest Hill in particular, it seems impossible to account for the almost vertical position of these strata by Faults, since they lap round a long pyramidical hill, without breaks at the angles!

At Wild Park, N E of Brailsford, and at Birchwood Park, E of Roston, two other patches of the yellow Limestone strata appear, and they seem to me, very probable indications of a Coal-field concealed by Gravel, extending for some miles to the S E, S, and S W of Ashburne, to which the Limestone strata of which these are contortions or humps (as above explained), are upper measures, though all are concealed by the Gravel, except at these two places. The Coal-measures, proved in the trials at Sprinx in Ednaston some years ago, and at Darley Moor, near Yeveley, although no Coal-seams of importance were reached, add greatly to the probability of my supposition, as to the existence of a Coal-field on the south of Ashburne, which being a populous district, far from Coal-pits, Navigations, or extensive Woods, for the supply of fuel, it would seem, that a more extensive and scientific search ought to be made, and the expense, perhaps, defrayed from a fund, supplied by a general subscription of the Inhabitants and Land-owners, who all have an interest in the discovery of Coal in their neighbourhood; at the same time, that the concealment which the Gravel here occasions, renders it a doubtful speculation for any individual Land-owner, to undertake the necessary search in his Estate; because, should he succeed, the probability is, are quickly perishable, as above mentioned. This character, of Grit-stone Rocks, of sufficient thickness to make a sandy or sandy Loam surface, where they basset, under favourable circumstances, interposed among various argillaceous strata, making always a surface more or less clayey and cold where they basset, is that which has determined my choice, in assigning colours and names in my large Mineral Map, to the different parts of the immense and important series of Coal-measures, which commence in Derbyshire and Nottinghamshire, and proceed through Derbyshire into Yorkshire, and may be called the great *Derbyshire and Yorkshire Coal-Field:* these have engaged a length and degree of my attention, sufficient to have completed their investigation, with the ready and important assistance which I have received from all ranks of Colliers, but for an immense Fault across this district, from Allestry, crossing the Derwent S E of Bur Hill, past Little Eaton, West-Hallam, and Kirk-Hallam, and thence, after crossing the Erewash near to the Road between Ilkeston and Cossall, in a ziz-zag form, almost along the edge of the yellow Limestone strata into Yorkshire (shewn by a full line on the Map), which was unknown, and its existence not even suspected, by the Colliers whom I conversed with, although its complete elucidation, is essential to understanding, either the order or number of Grit-stone Rocks, Coals, and other remarkable strata, which compose the whole of this interesting Field.

These difficulties, and the impatience of the Board for the completion of the Rural Observations throughout the County, which are the more immediate subjects of their Reports, necessitated me to leave several parts of this and the other Coal-districts, where the colour is dark Green, in an unfinished state, with respect to the colouring of the numerous *Grit-stone Rocks* which traverse them, and divide the country into intervening strips of argillaceous strata, which I call *Coal Shales*, for the sake of distinction; and which is the reason, that in the parts coloured dark Green, several Hills in Sect. 1 (p. 16), of this Chapter, and several Collieries in the List of them which follow, are without the usual denominations of their strata, or are marked, some of them, with a ? as being somewhat doubtful.

This uncertainty, most affects the upper part of this Coal Series, as is evident from the great zig-zag Fault being so near to the yellow Lime, perhaps, through the whole of its length northward, although I have yet determined its place, but a few furlongs further north than South-Anston. Yet the interior or middle parts of the Series in this Field, are affected by such great local Tilts, Denudations, and consequent crowding of the different Rocks and Measures together, around Calow, on the E of Chesterfield[*], and thence N and NW to

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[*] It would be an act of injustice in me, here to omit acknowledging, that Mr. *John Charlton*, of Calow, a very ingenious Mechanic, Collier, and Iron-Smelter, in charge of Messrs. Smith and Co.'s Adelphi Furnaces in Duckmanton, had, previous to my undertaking this Survey, ascertained correctly the continued Bassets of all the south end of this highly curious Denudation; and had, previous to my knowing him, repeatedly pointed them out to Mr. White Watson on the spot, and explained their identity with the regular bassets of these same Rocks, Ironstones, Coals, Shales, &c. between Chesterfield and Brampton, at the time that Mr. Watson was altering, and attempting to improve upon the copy of a hasty *Section across the County of Derby*, which I made at his request, and lent to him in November 1807, for the purpose of his copying it, and making inlaid Tablets agreeably to it.

Also, that Mr. *George Booker*, of Chesterfield, Messrs. Smith's Agent at Boythorp Colliery, with scarcely less discernment and perseverance, had to near Bull-close Farm, also, around Piper, on the N of Sheffield, in Yorkshire, and thence N, NW, and W, to Oughty-Bridge, and perhaps to Broomhead-Hall, and in other places, that I judged it best, instead of 40 different strata at the least, into which this Coal-Field will be divided on my large Map, when completed, to attempt in this diminished Map, only a separation of the three lowest Grit Rocks (Nos. 2, 3, and 4), and the three lowest Coal Shales (Nos. 1, 2, and 3), from the rest of the Coal-Field, which I have done, by a lighter Green colour, extending from Little Eaton, near Derby, to Penistone, in Yorkshire; the dotted line between the light and the dark Green, marking the exact place, where the 4th Grit Rock bassets or appears from under the 4th Coal-shale. To such division of this Coal-field for the present purpose, I was induced, from finding this 4th Rock, but no higher ones, in Glossop and other parts of the great *Derbyshire and Lancashire* Coal-field, on the N W border of the County, or in the *Cheadle* Coal-field, in Staffordshire, and from the remarkable and valuable properties of this 4th Rock itself, the same, which in its further progress northward from Penistone, is worked at the Ealand-Edge

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had ascertained and traced the continued Bassets of the Calow Measures above alluded to, for two or three miles in length to the west of Chesterfield, and correctly pointed them out to me in October 1808. And that Mr. *William Parkin*, of No. 36, Old Street, in Sheffield Park, Yorkshire, a practical Borer, Sinker, and Collier, had, by the industrious application of his Sundays to it for several years, traced and correctly ascertained the continued Bassets of all the principal Coal-seams and Ironstone strata, for eight or ten miles north of Sheffield, and nearly as far southward. The instances being so extremely rare, of any general or extended ideas of Stratification with practical Miners, well entitle these three ingenious Individuals to the most honourable mention from me.

and Cromel-bottom Quarries, on the Calder River, S E of Halifax, in Yorkshire, for the supply of London with foot-paving stone (called Yorkshire Paving), and lately for Steps, Window-Cils, and numerous other purposes; being also the stone procured at Kerredge, N E of Macclesfield, in Cheshire, and at numerous other celebrated Quarries, as will appear from my general lists of Freestone, Paving and Grey Slate Quarries, in the next Section.

The great Derbyshire Fault already mentioned, p. 146, &c. seems to determine the great Derbyshire and Yorkshire Coal-field on the south, from near Lenton, in Notts, to near Allestry, by a "Rise parallel" on the north, and "Section parallel," or nearly so (Forma 3¹), so considerable, as to bring the Coal-measures, which lay greatly below the Red Marl and yellow Lime, to a level with Red Marl, on the surface: the Red Marl, yellow Lime, and some of the Coal-measures, being entirely stript off and denudated in the neighbourhoods of Wollaton, Trowel, Stanton, Dale, Stanley, Morley, Bredsall, and Little Eaton, between the great Derbyshire Fault and the one N of it, already mentioned, as a continuation of the great zig-zag Fault through Kirk-Hallam, West-Hallam, and Little Eaton; which denudated tract of Coal-measures extends northwards thro' Cossall, Awsworth, and Greasley, in a narrow strip, between the zig-zag Fault on the W and the covering strata of yellow Lime on the E, and therein the ancient basset-pits or shallow workings, and indeed the actual bassets and original *open-works*, or Open-casts, appear, of the Coal-seams which have been since successively pursued or worked further and further into the deep to the eastward, till now the deep range of these Collieries is nearly in a line from Greasley through Nuthall to Radford, almost. As the zig-zag Fault, in proceeding northward, through Awsworth and Greasley, approaches nearer and nearer to the edge of the yellow Lime, the Bilborough and Nuthall Coals (which are or have been worked *under the yellow Lime*, as above) come at length, somewhere N of Awsworth, to basset against the zig-zag Fault, and continue so to do, perhaps, for some miles northward, without appearing on the surface. For some distance N of Greasley Church, none of the measures from under the yellow Lime, or uppermost of this Coal-series, are seen, owing to the zig-zag Fault following the very edge of the yellow Lime. At length in proceeding northward, the Fault begins to diverge, and to shew a series of basseting measures of the upper part of the Series, increasing in width, with some local irregularities, to Skegby, and then decreasing again, till opposite Blackwell: in all which distance, between Greasley and Dirty-Hucknal, it does not appear, that the Coals under the yellow Lime, which for distinction I will call the Bilborough Coals, have either been proved, or that their existence is now suspected *; and this principally, owing to an opinion prevalent with most Colliers of the district, that the Bilborough Coals leave the yellow Lime at Greasley, in Nottinghamshire, and have their basset to the W of Brinsley, the W of Selstone, the W of Pinxton, in Derbyshire, the W of Blackwell, &c. all of which places, the reader will observe, are on the W side of the great zig-zag Fault which I am describing. But I shall proceed with this description, and mention, that at Skegby Colliery, the Bilborough Coals are again known, and are in work, under some of the lower beds of the yellow Lime series; the same Coals are also worked at Dunshill, a little NW of the last, and in 1805 were proved, by boring, ¼ *m.* N of the Bridge, in Plesley Town, as I have been informed. At Palterton, Shuttlewood-Common, and Stanfrey, Coals have been worked in these measures from under the yellow Lime, and are now so working W of Clown.

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* This was the representation made to me on the spot in October 1808; but I have since learnt, that 20 years or more ago, a good minge Coal, about a yard thick, was worked, about a furlong SW of Beauvale Abbey, on the N of Greasley, very near to the edge of the yellow Lime.

At the W end of Barlborough Town, and again at Barlborough Hall, the zig-zag Fault touches the edge of the yellow Lime, and leaves no space for the basset of the upper part of the Coal-measures; but proceeding a little further north-east, we find Knitaker Colliery to have been worked, both in the Measures basseting from under the yellow Lime, and also with several Pits sunk through the yellow Lime (and blue Beds, mentioned p. 157), just as at Bilborough and at Greasley deep or south-easternmost Pits. And here, as is not a little singular, circumstances have favoured a similar mistake, with the practical Colliers, to that before alluded to, the Pebbley-lane coal being esteemed the same seam as the Knitaker above mentioned, and as the seams which range and basset to the E of Killamarsh, the W of Wales in Yorkshire, the W of Oughton, the W of Treton, and the E of Darnal, &c. places which lay on the W of the great zig-zag Fault, and the line of which diverges still more from the edge of the yellow Lime, than those above mentioned to the NNW of Greasley did.

Still pursuing the zig-zag Fault into Yorkshire, for more than a mile in Harthill, we find it bounding the yellow Lime, with no basset of the Measures from under it, but in the next succeeding mile, owing to an excavation for the course of the White-water Rivulet to the east, into the Idle, these upper Coal-measures basset again, and the deep-cutting and part of the Tunnel of the Chesterfield Canal is in these Measures, before it crosses the great Fault, not far from the eastern end of the Tunnel. From a little N of the Canal, to and through South Anston Town, and then northward through North Anston Town and some distance further, the Fault again follows the edge of the yellow Lime, shewing its tremendous effects, in a striking manner, in the fallen Rocks called Clark's Stones, at the north end of the latter place.

From the foregoing description it will appear, that all the Coal-measures on the east side of the great zig-zag Fault, from Trowel in Nottinghamshire, to North Anston in Yorkshire, and still further northward, have an easy dip to the east, similar to the yellow Lime, and like it, may be esteemed as preserving a level in a north and south direction, for small inequalities cannot be noticed in a general description like this; but when we come to examine the Measures on the west side of this curious Fault, though there is a perpendicular rise on all its western side, yet this rise is very unequal, increasing and decreasing by turns, and changing from S to N, and *vice versa*, which, together with numerous large cross Faults, which branch from it towards the west, occasion the ranges or bassets of strata to be continually coming up with different degrees of obliquity *and terminating abruptly at this Fault*, in all the variety of cases of "increasing rise," shewn in Formæ 4^1, 4^2, 4^3, &c. 7^1, 7^2, 7^3, &c. and 8^1, 8^2, 8^3, &c.

I have already mentioned two cases, of Coal-seams thus approaching the zig-zag Fault and yellow Lime, and which happening to have about the same thickness and level with our Bilborough Coal in those places, viz. Greasley and Knitaker, have been mistakenly concluded to be *the same Coal*: but as this is a position which some probably will dispute, I shall proceed to mention two instances of the Grit-Rocks thus approaching this Fault, which will admit of no doubt or dispute, with those who will carefully examine the face of the Country.

And first, Boston Castle on the S of Rotherham in Yorkshire, situated full five *m.* W of the basset-edge of the yellow Lime, is upon a very remarkable and thick soft salmon-coloured Grit-stone Rock (perhaps No. 16 in my Series), having a moderate dip to the NE, or nearly: this Rock, has the Herringthorpe and Royds-moor, the Brecks and Hollings-moor Coals, the Wickersley Grind-stone Rock, and a vast succession of other strata, as upper-measures to it, and laying between it and the yellow Lime Strata. Instead of this salmon-coloured Rock having its range nearly N and S, in order to be parallel to the range of the yellow Lime, it proceeds nearly S E through Whiston, Gilfit, Ulley, and Todwick-Grange, to Kiveton Park and South Anston Town, where the same for ¼ of a mile in length, actually abuts against the yellow Lime Rock, and is so exactly of the same height with it, that there is nothing to point out the place of the Fault, but a sudden transition from yellow Limestone to salmon-coloured Grit-stone on the surface, and a Pond on the Fault-stuff without-side of the Park. In Harthill, a detached part of the same salmon-coloured Grit, has a similar and abrupt junction with the yellow Lime for a mile or more in length, E of the Village. I am inclined to refer the salmon-coloured soft Grit of Bredsall and Morley Moors near Derby, and of some other places E of these, to this same Rock, which I believe no where appears in the intermediate country between Harthill and these, owing to the increasing W rise of the zig-zag Fault, towards the S.

The second instance is, of the 13th Grit Rock, which occupies the surface of the hill near the S W end of Staveley Town, and is about 3¼ *m.* distant from the edge of the yellow Lime at Oxcroft, between which places the dip is uniformly to the east or south-east, and a vast succession of Measures are seen as upper strata to this 13th Rock; whose range or basset-edge, can very satisfactorily be traced southward through Inkersall, between Duckmanton Furnace and the Town, through Sutton Town, past Heath Church, and pointing for Alt-Hucknal Church, until within less than a ¼ of a mile of the edge of the yellow Lime (direct for which it was making), it is suddenly arrested by the Fault, and disappears all at once, N E of Stanesby Mill.

I have been the more particular in describing this great zig-zag Fault, because it is the joint or hinge as it were, from whence all the Measures to the westward take a more rapid rise towards the mountain district on the west side of the northern part of Derbyshire; and which rise continues, with only local variations, until all the vast Series of Coal-measures (both dark and light Green) in the Field which I am describing, have basseted, and the 1st or Millstone Grit (which is included in the purple colour in our Map) appears from under them, along the dotted line from Little Eaton through or near Belper, Crich, Tansley, Darley, Beely, Chatsworth, Curbar, Fox-House, Hallam in Yorkshire, Stannington, Moscar-house, Strind's Inn, Bradfield Chapel, Old Booth, Saltersbrook House, Woodhead, &c.

Around Ashover, one of the most perfect specimens of local denudation is to be seen, that can perhaps any where be witnessed; this has stript off the 2nd Grit and 1st Coal-shale, as shewn in the Map, and laid bare a considerable tract of the 1st Grit and Limestone Shale (Purple), &c. as will be explained further on. The detached patch or Hummock of Coal-measures, consisting of the 2nd Grit and 1st Coal Shale, around Alderwasley, seems owing to a very similar denudation around Crich, to that around Ashover, only, that the deeply excavated channel of the Derwent River, entering this denudation from Cromford, has detached these Coal-measures from those near Lea; and the very great elevation of the strata NW of Belper, has occasioned the 1st Grit to be laid bare in that place also, by which the Alderwasley Coal-field is entirely detached, as shewn in the Map; while the deeply excavated Vale of Derwent, above and below Belper Bridge, has almost detached the patch of Coal-measures NW of it. The local and deep denudations, or rather perhaps, the River excavations S of Stannington and N of Bradfield Chapel, have in like manner almost, but not quite issolated or detached, two patches of the Grit and Shale, below all the Coal-measures.

Combes Moss nearly N of Buxton, a table Mountain of Shale and 1st Grit, has a small patch or depressed Hummock of the 1st Coal Shale, not denudated or stript off it: and I am not without expectation, that a similar and larger patch or depressed Hummock will be found on the Kinder Scout range N of Edale Chapel, concealed under the impassable Peat Bogs which there abound: this might be highly important to the Noble Owner of the Estate, and to the country, to ascertain*.

Having passed the Grand Ridge of the Island, we find a rapid dip taking place in the Shale and Millstone Grit (Purple) towards the west, and the 1st or lowest Coal-shale begins to cover the 1st Grit, along the dotted line from near Hag in Lancashire, past or near to Mossley, Armfield in Cheshire, Glossop in Derbyshire, Chunall, Hayfield, White-hough, and thence southward to near Flash in Staffordshire: and after a break of some distance, owing to cross Faults and Tilts, the same eastern edge of Coal-measures is continued to Bramcote.

The rapid western dip which I have mentioned above, into the great Derbyshire and Lancashire Coal-field, continues only to the bottom of a Trough (see Formæ 1 and 1^2), which extends almost in a straight line from Bramcote through Gold-sitch Moss, and thence N along the boundary between Derbyshire and Cheshire to Taxhall, and further, and then across Derbyshire to the same boundary again near Mottram. From the bottom of this trough, which might without much impropriety be called the Goyte Trough, the Measures rise again as rapidly towards the W, particularly from Disley in Cheshire to near Meerbrook in Staffordshire, between which places there seems a Ridge (Formæ 2 and 2^2), to which the Measures rise, and then decline or dip again W, but not so rapidly as they rose: this occasions the Coal-measures in this Field, again to cover the 1st Grit for some miles SSW of Disley; when a Fault commences, which proceeding S, connects with the great Derbyshire Fault, and between this Fault and Macclesfield, the Measures again basset towards the W.

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* Besides the detached patches or Hummocks of the 1st Coal-shale at Alderwasley, Combes Moss and Kinder Scout? mentioned above; there are two detached patches or depressed Hummocks of the 2nd Coal Shale in the Goyte Trough, viz. Goytes-moss and Shallcross, and there is another depressed Hummock of the lower or Crow-stone part of the 2nd Coal-shale, near Darley-flash Hall, on which Shale patch Ashover, Matlock and Darley parishes meet.

How much farther to the westward this undulating of the strata may continue, I am unable to state, having concluded my observations on this side, by tracing, either the dip of the 4th Rock under other Measures, or its termination at a Fault, from near Pott-Shrigley in Cheshire northward, as far as Hag in Lancashire, as shewn by the dotted line in my Map, bounding the light green colour on the west. From the few excursions which I made beyond this line, to visit the Collieries near, in Cheshire and Lancashire, I am induced to think, that enormous Faults occur in these districts, which will render the elucidation of their highly valuable Strata, containing more than 50 seams of Coals in a few hundred yards of sinking, a work of some labour and difficulty.

On the SW of Cheddleton in Staffordshire, the Coal Series which we are describing is seen, covering the 1st Grit, but how far the Series extends westward, I have not ascertained.

From near Dilhorn northward, and round by Ipstone Edge, and southward to near Oak-moor Mills, the 1st Grit declines southward, or rather, towards Cheadle, as a centre perhaps, and the lower part of the Coal Series covers it, in Ipstone, Foxton and Kingsley; near Cheadle and to the south of it, the Coals are thicker and better in quality, but the great thickness of Quartz Gravel which occurs to the southward and round the Town, prevented my tracing these very satisfactorily; only, from the Red Marl found on the S of this Coal-Field, it seems plain, that the great Derbyshire Fault must range at no great distance from Cheadle S, as before mentioned, p. 146.

The Coal-Field round Ashby-de-la-Zouch in Leicestershire, is one of the highly curious, but perhaps not uncommon occurrences in the Red Marl districts, a tract entirely surrounded by a Fault or Series of Faults which unite, seems lifted up through the Red Marl strata, and denudated, the Coal strata having *rapid dips* in various directions, while the surrounding strata of Marl are *horizontal*, or as nearly so as may be. On the north-eastern and northern border of this Coal-Field, the yellow Lime, its upper strata, are seen lifted up with it, from Grace Dieu to Ticknall, and perhaps also to Decoy Wood in Bretby, as observed page 158.

Some Collieries occur to the E and S E of Tamworth, which fall within the limits of my Map, and are mentioned in my general List of Collieries which follow; but whether they form a separate Coal-field surrounded by Red Marl, or are on the Northern skirt of the Coal-Field, which extends from near Coventry through Bedworth, &c. in Warwickshire, I am unable at present to state.

Round Pelsall in Staffordshire, and to the north of it, other Collieries occur, which fall within the square of the Map, but its title prevents their being shewn, yet I have included them in the general List.

I have ascertained the Coals about Pelsall, to belong to the Dudley Field, or to the Series above the yellow Lime, which has a regular dip from Rushall and Hayhead Limeworks near Walsall, towards and under the Pelsall Coals.

It may be material to some that I should mention, that the great or *Limestone-Shale* below the 1st Grit, which is included in the Purple colour of the Map, sometimes contains a proper seam of bright Coal, of ¼ of an inch to 2 inches thick, and has some vegetable impressions, Ironstone, ochry Water, and other indications of Coals in its measures; but such beds or seams of Coal are of small extent, and serve only to induce expensive trials, with those unacquainted with the order of the Strata. In speaking of the Grit and Shale district further on, I shall instance a few of the places where such thin Coal-seams have appeared, and where fruitless trials were induced by them.

It will interest the curiosity of some to mention, that a vein or vertical fissure in the 3rd Toadstone, on the N E of Hopton Hall, was discovered about 1796, in cutting the new or Via-Gellia Road, which was six inches wide, and filled with a bright, spiry, and dicey *Coal*, very inflammable, having white joints, or thin septa of spar; but that in following it, the Coal soon terminated against hard Toadstone in the Vein. Messrs. Joshua and David Gregory, of Wirksworth, gave me this information, and when at Hopton, I saw the hard Vein of Toadstone mentioned above, which seems a *Win-dyke* on a small scale, the only thing of the kind which I saw or heard of in Derbyshire, and which appears to answer to Dr. Wm. Richardson's account of such Dykes, in the 9th Volume of the Transactions of the Royal Irish Academy. I am inclined to think, that indurated Bitumen, and not real fossil Coal, occupied a cavity in the vein above mentioned.

From the account which has been given (p. 165) of the great zig-zag Fault, ranging near to the eastern edge of the great Coal-Field in Derbyshire, it will readily be perceived, that the whole of the Series of Coal-measures in the great Derbyshire and Yorkshire Coal-Field, cannot be seen or discovered on the surface, in crossing from east to west, in any part of Derbyshire, and perhaps a complete Section or Series of them cannot be obtained, from the sinkings ascertained at any or all of the Derbyshire Pits, without taking in several from Yorkshire, to connect them; a work which I hope, at no distant period, to be able to accomplish; and to distinguish the Measures that are most subject to vary in their thickness, which some of those between the Coals are, in a remarkable degree.

These variable Measures, or Girdles, occasion, in some places, the Coal-seams, which in other places lay some yards asunder, to approach so near together, that they are worked together, and denominated one Coal, of which the most remarkable instance is in the Dudley Coal Field, in Staffordshire, where so many Coal-seams, separated only by Bats or thin strata of dirt, are brought together, as to make what is there called a Coal 33 feet thick, over a large tract of Country, and this thickness is even said to be 45 feet at Windmill-hill Colliery! In this Coal-field, the thickening of the intervening Measures is so remarkable, that a parting of white stone, only one inch thick in some places, at Bloomfield Colliery begins to thicken northward, so as to occasion the basseting of two beds of Coal above it, part of the thick Coal above mentioned, while the 11 other Coal-beds below it, continue to keep their cover as far as Bilstone*. The Coal of 17 to 21 feet thick at Measham, and to the NW of it, in Leicestershire, seems to me probably owing to a similar diminution of the thickness of the intervening Bats, Tows, or other dirt beds; and so does that of Quarrelton, near Johnston, in Renfrewshire, in Scotland, of 25 to 30 feet thick, where single, mentioned by Dr. Millar, in his 2nd Edit. of Williams's "Mineral Kingdom," vol. II. p. 320.

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* See Mr. James Keir's curious account of this Coal-Field, in Shaw's History of Staffordshire, or in the Monthly Magazine, vol. 28; see also, Mr. Westgarth Forster's account of similar variations in the thickness of Measures in the Tyne and Wear districts, "Treatise on a Section of Strata," p. 24.

The quality of the Coal-seams, in many instances, change, from *hard* to *soft* or *crozling* Coals, and *vice versa*, similar to what Mr. Richard Martin has observed in the South Wales Coal-Field, Basin, or Swilly (see Philosophical Transactions, 1806): thus, on the banks of the Erewash, at the southern end of the great Derbyshire and Yorkshire Coal-Field, hard Coals abound, and crozling or melting Coals are very rare; but as we proceed northward to Staveley, the crozling Coals become plentiful, and Hard or stone Coals rather scarce, and still more so as we proceed further North into Yorkshire. The circumstances just mentioned, of the variable distance of the Coal-seams in different Collieries, and the gradations of hard and soft Coal into each other, have, as I think, contributed, as well as the zig-zag Fault (p. 162), to prevent the complete and general knowledge of the measures of this valuable Field, by the many very intelligent Colliers who reside in it, and I mention them here, with the hope of drawing their attention in earnest to these subjects; as also, that they will notice, more particularly, the bassets of the thick stone beds or Rocks, and rich Ironstone balls or strata, found in their sinkings, and trace and connect these Rocks, and these Ironstone Rakes (where such have been worked), as far each way on the surface as their opportunities will permit.

I have mentioned already (p. 161) that the Grit-stone Rocks are 20 in number, or thereabouts, which occur in this Coal Series; and it is observable, that all of these, except two, have their grains of silex rather small, some of them exceedingly so, and they abound with minute plates of Mica, called Silver, Spangles, &c. and have argillaceous cements. The two coarse Rocks alluded to, are one of them included in the light Green of the Map which I am now describing, viz. the 3rd Grit Rock, and one of them in the Purple, viz. the 1st Grit Rock, or MillstoneGrit*. I mention the latter here, in order to point out a material error, into which the late ingenious Mr. John Whitehurst was led, owing to his not having noticed the coarseness of the 3rd Grit Rock, in stating, in his "Inquiry concerning the Earth," in several places in both his Editions, that Coal is never found under the coarse or Millstone Grit, which seems true (as far as workable seams are concerned) of the 1st or lowest regular Grit Rock in Derbyshire, but not of the 3rd Rock, because three workable seams of Coals often occur beneath this 3rd Rock; and it was owing, as I suppose, to a confused account which he received of a *Fault*, ranging east and west, which was proved on Baslow Common, in driving up the level to the Colliery formerly worked in Chatsworth Old Park (for I believe Mr. Whitehurst to have been a Man of the strictest veracity), that he describes a *great Fault* as crossing this Colliery from south to north, and gives a Section of the same in his 4th Plate, 2nd Edit. which has no existence, as I have satisfied myself, by inquiry of the Colliers last employed there, and by a careful examination of the ground, with the Noble Owner's Plans in my hand, with which I was favoured by Mr.

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* I shall have to speak, further on, of an accidental coarse Rock, N of Winster, which lays below this in the Limestone Shale.

Knowlton, his Agent, in order to prepare a more correct Section of the Strata in this place, which at a future opportunity I shall publish, only further remarking in this place, that what Mr. Whitehurst describes as the 1st Grit Rock in the New Plantation, is in reality the 3rd Grit Rock, not less coarse in its grain or particles of Silex than the 1st Rock, and under which both the 1st and 2nd Grit, and the 1st and 2nd Coal Shales lay, as any one may satisfy himself, by a comparison of the Measures in Baslow Colliery, now in work, on the N side of the Old Park.

It is not a little curious, that there are two very coarse grained Grit Rocks near to the bottom of the upper Coal-series, above the Lime Rock, S of Newbold-Astbury, Cheshire (at the northern edge of the Pottery Coal-Field), very much like the 1st and 3rd Rocks of our Series; these I saw on Mole-copt, Cloud End, Wickenstones Rocks, &c. between Leek and Congleton, in Staffordshire and Cheshire. I ought, however, to caution my readers, against confounding the four coarse Grit Rocks here spoken of, with the Gravel Rocks of alluvial districts; since, though particles of quartz, often nearly transparent, of all sizes from the smallest grain of Sand, to others three quarters of an inch in diameter, are not uncommon in the 1st and 3rd Grit, and other coarse Rocks, yet that such large particles of quartz are perfectly distinguishable from *rolled* Pebbles, although their want of sharp angles, and their greasy looking surfaces, have, probably, induced Mr. Whitehurst and Mr. Mawe to call them rounded or rolled Pebbles, but from which they must be carefully distinguished.

The immediate *floor* of every Coal-seam within all this large district, and every other which I have visited, is either a Clay, in some degree of induration, called Clunch, Seat-earth, Warren-earth, Sloam, Spavin, Scud, &c. or a peculiar kind of hard stone, called Crowstone, or Ganister, which, though an admirable material for Road-making, yet, when pounded fine, and kneaded with water, it has all the properties of fire-clay, which so remarkably distinguish the Coal floors. The Crowstones seem peculiar to the 2nd and 3rd Coal-Shales, but in some parts of these Strata, it is not sufficiently indurated to serve for Roads. As these are important Strata, both on account of large and curious vegetable impressions which they contain, and for their use in Road-making, and for the Crucible-makers, I shall give a List here, of places where I have observed the beds and Quarries of *Crowstone*, and others will be found in the list of Collieries which follows, viz.

Abbey-dale, in Norton.
Bar-gate, in Horsley.
Baslow Moor.
Beeley Moor.
Bents, near Totley.
Birkin-lane, in Ashover.
Brackenfield, in Morton.
Broadhurst-edge, in Mellor.
Chisworth, in Glossop.
Clod-hall, near Baslow.
Crooks-moor, in Sheffield, Yorkshire.
Darley-flash, in Darley.
Fulshaw, near Penistone, Yorkshire.
Hazlehurst, near Ashton-under-line, Lancashire.
Hill-house, in Bugsworth, Glossop.
Hunger-hill, near Stanage, in Chesterfield.
Killis Farm, in Horsley.
Lindow-lane, in Crich.
Little-moor, in Ashover.
Loxley Warren, near Stannington, Yorkshire.
Ludworth, in Glossop.
Openwood-gate, in Horsley.
Ouler-Bar, in Holmsfield.
Pott-Shrigley, in Cheshire.
Prass, in Ashover.
Ringing-low, in Fullwood Chapel, Yorkshire.
Sida, near Loads, in Chesterfield.
Spons, near Pott-Shrigley, in Cheshire.
Stanage, in Ashover and in Chesterfield.
Stubbing-edge, in Ashover.
Wadsley, Yorkshire.
Wessington-green, in Crich.
White-low, in Sheffield, Yorkshire.
Woodseats, in Norton.

In numerous other places the Crowstone might be discovered, by a search on proper principles, and applied most beneficially, to the Roads; as generally, where it is to be met with, other proper Road-materials are not to be had, but at a great expense of carriage.

I have observed, that the *Slines*, or length-way joints which naturally divide the Coal-seams vertically, generally range about E S E and W N W, so that the Coals *face the two o'Clock Sun*, or the Board, is in that direction, as the Colliers term it, or very near it, and that such natural joints in the Coal are not affected in their direction, by the *dip*, however rapid or easy, or to whatever point of the Compass it may tend, nor by the Faults. Which curious facts seem to prove, that the kind of Crystallization which broke the Coal-seams into their regular rhomboidal pieces, was completed, prior to the Faults and dislocations of the Strata.

The Soil in the Coal districts, as I have before observed, inclines much to Clay, owing to the perishing of the argillaceous Binds, Shales, Clunches, &c. at their basset-edges or out-bursts; and too often, such soils are of an inferior quality for agricultural purposes; the only striking instance to the contrary which I noticed, was at Measham, where the Land is very good upon the Coal-measures, perhaps owing, to a mixture of alluvia.

Draining and liming seem, generally speaking, to be essentials to the proper occupancy of a Farm in the Coal districts. When laid down to grass, I have noticed, in Chatsworth Old Park and elsewhere, that the small daiseys, and other beggarly weeds, are more disposed to prevail than grass, on the strong soils of the Coal district. The 3rd Coal-shale or Crowstone ground, is particularly distinguished by its black cold Soil.

The Coals in Derbyshire and Nottinghamshire are, for the most part, worked by Leasees: the Duke of Devonshire, Lord Middleton, Earl Manvers, Edward Miller Mundy, Esq. William Drury Lowe, Esq. Rev. Henry Case Moorwood, and Rev. Dews Coke, are the only considerable Land-owners who work Coals on their own account, except it be in a small way, for their own and neighbours' consumption.

The mode of letting Collieries in Derbyshire generally is, by the Acre of Coals that are worked, ascertained annually, by a survey and measurement of the subterranean works: the prices which I heard mentioned, were from 50*l*. to 180*l*. per acre, according to the number and thickness of the seams, their quality, depth, quantity of Water, distance from a Market, &c. &c. Other Coal-owners let their Coals, reserving a fixed rent per Ton for all which are sold: the prices in these cases vary, as I was informed, from 4*d*. to 16*d*. per Ton.

Vast quantities of Coals are annually sent out of the Counties of Derby and Nottingham southward, by means of the Cromford, Derby, Erewash, Grantham, Leicester, Melton-Mowbray, Nottingham, Nutbrook, and Trent Canals or Navigations (of which some account will be given in Sect. 3, of Chap. XVI.), and others with which these connect. The *Ton* has been the usual denomination, by which these Coals are sold to the Boat-men and dealers; but previous to 1798, the quantity or weight allowed to a Ton, varied at almost every Coal-wharf or place of loading the Coals, brought down by rail-way branches of the Cromford, Erewash, Nottingham, and Nutbrook Canals, from the different Collieries in their vicinities, by which uncertainty of the weights, frauds, and frequent disputes were produced, and the Navigation Companies were much inconvenienced, in collecting their Tonnage Duties on the passage of these Coals along their respective Canals and Navigations. These produced, in the above year, Meetings of the principal Coal-masters of the above district, and of the Committees of the above nine Navigation Companies, and after some discussion it was agreed, to put an end to all diversities of weights carried on these Canals, by the erection of a sufficient number of Weighing-Houses upon them, and of so modifying their several sets of Bye-Laws relating to Tonnage, that every Boat used on them, should previously be numbered, described, and gauged in the most minute and accurate manner, at their joint expense, and the particulars printed, for the general use of their Toll-Clerks, and of the Traders and Coal-masters; and the latter agreed, instead of ascertaining the weights of Coals sent off from their respective Wharfs, and there keeping Accounts, as had before been done, to appoint a sufficient number of general Clerks at the Canal weighing houses above mentioned, who should not only ascertain, by the depth of loading and printed Tables above mentioned, the *quantity* of Coals on board every Boat which passed, but that they should also calculate their *value*, and *take the Money* for them from the Boat-men, according to the price per Ton of 120 lb., fixed by each individual Coal-master on his Coals at the previous stated Meeting of the Coal-masters, placing the same to the proper account of such Coal-master, in a set of Books kept by such general Clerks, who should account and pay over such Moneys to the Coal-owners, at short stated periods: by which means, the giving of different weights or lengths of credit, would be done away, and the prices and quantities from each Colliery (except their land-sale) would be known to all the other Coal-masters.

Thomas Walker, Esq. of Bilborough, Notts, was selected by the Canal-Committee and other Coal-masters, to digest and carry into effect, the building of the necessary Weighing-houses and Offices, and contriving the most exact and expeditious methods of gauging the Boats, and of guarding against the various errors and frauds to which the scheme might be liable: a task, for which his great Mathematical knowledge, and extensive practice as a Coal-master and Coal-Viewer, eminently fitted him; and for his services in these matters, the Canal Companies mentioned, presented him, on the 18th of January, 1805, with a large and elegantly ornamented Silver Cup and Cover, with a suitable inscription, "as a testimony of the high sense entertained of his ability and indefatigable attention, in completely carrying into effect the plan of *weighing and gauging Vessels*," &c.

In the Autumn of 1808, when I visited this district, four octavo Volumes of the particular measurements of Canal Boats, had been printed by Tupman and Co. of Nottingham (of whom I believe they can be purchased by any one), which contained every particular of the history of each Boat, and its dimensions at each inch, like the inching of vessels by Excisemen, viz. of 430 wide Boats and 60 narrow Boats, used on these Navigations, with all the necessary introductory remarks and rules for their use.

Lord Middleton and William Drury Lowe, Esq. were mentioned to me, as the only considerable Coal-masters, whose Coals pass on the Cromford, Erewash and Nottingham Canals, who had not come into the plan above mentioned, for ascertaining the weight and collecting the money for their Coals. One of the Coal-masters, shewed me the general account rendered to him from the weighing Office, for 12 months to the end of June 1808, from which I extracted the following particulars, viz. That in that space of time, 8286 boat-loads of Coals passed on the above three Canals, in their way towards the places of consumption, which contained

Hard Coals	205,006	Tons.
Soft Coals	37,289	—
Cobbles	27,161	—
Cokes	24,384	Quarters.

The value of which amounted together, to 122,838*l.*

The *Hard Coals* are, as appears by the above account, almost the only Coals which the buyers for the Midland Counties south and east of Derbyshire will purchase, and only such are deemed hard Coals, as can be loaded into the boats in pieces from near the size of a man's head, at the smallest, to the largest pieces which can be lifted by two or three men. The soft Coals of these districts do not crozle or melt together in burning, except in some few instances (when they are called *Smithy Coals*, as at Benty-field, Dunston, Hollinwood-common, Swadlincote, Troway, and other places), and are tender, and liable to break small by keeping, or unless moved with the utmost caution; yet I see no reason to doubt, that by some of the care that we in London are obliged to use, in moving Coals and in mixing the large Coals of one sort with the small of another, owing to the high Duty we pay on the article (from which the districts alluded to are wholly exempt), that a large portion of the soft Coals, now nearly, if not entirely wasted, in the working of the hard Coals, here and about Wednesbury in Staffordshire, and numerous other places, might be sold and used, and this invaluable article be by that means husbanded, for the use of future generations, as well as rendered cheaper to the present. The waste of soft Coals to which I allude, in hurrying after the hard seams because more saleable, exceeds all belief, and is a subject to which the owners of the soil ought more to attend than they do, and perhaps the Legislature ought to take up the subject; allowing soft Coals which do not crozle, to be brought to London by Canals, or carried generally by sea coast-ways, at considerably lower duties than hard or crozling Coals, would perhaps go far towards remedying this crying evil, which cannot be fully seen or understood, without entering into the under-ground operations of the Collier, although enough of it may be seen on the wharfs and rail-way branches, of the Nutbrook Canal in particular, to satisfy any one that a change is wanting.

But one serious attempt has been made, at trying the Coals of the Erewash district, of which I am speaking, in the London Market, where, owing to the heavy expense on Inland Navigation before they reached the mouth of the Humber, and then paying the same Duty on being sea-carried, as those from Newcastle and its neighbourhood, the adventure was attended with considerable loss. Obvious justice to the inhabitants of London and the south-eastern and south Counties of England, seems to demand, that the Duties on carrying Coals by Sea Coast-ways, should be apportioned in some degree, to the cost of carriage to the place of their shipment, otherwise an effectual *monopoly* is created, in favour of those few places where the Coal-measures approach the Coast, and where the Coals can therefore be shipped at the least expense; and so also, of Coals brought by a long series of Canal Navigations, which are so much more expensive than by shipping, because, if such Coals pay the same duty as the sea-brought Coals, it amounts almost to a prohibition, as the Trade in Coals by the Paddington Canal has proved, since such, though of inferior quality for most uses, were loaded with the same duty as the Newcastle Coals.

Cobbles in the above account, are what we in London should call good round Coals, being the larger lumps picked out of what they call the Sleck, or waste small Coals, above-mentioned.

Mr. Joseph Butler of Killamarsh, an experienced Collier and Iron-master, divides the Derbyshire Coals into three sorts, viz.

Hard or stone, which burn to a white ash.

Soft or bright, which burn to a white ash.

Caking or crozling, which usually burn to a red ash.

Mr. David Mushet, late of Somercotes Furnace' in this County (now of Coleford in the Forest of Dean), has ascertained the specific gravities of several sorts of Coals in this and other Counties, and given their Analysis and comparative uses in Iron-smelting, in the Philosophical Magazine, vol. 32, page 140, to which I must refer.

The Coals in old inclosed parishes, in some instances belong to one person, and the land to another, and even the Iron-stone is again separated by Leases, as in Somercotes and some other places: in such cases, the cultivation suffers severely, from the want of any common interest between the Farmer and the Miner. On this subject I shall have more to say further on, in speaking of the Mineral Districts, and on Inclosures in Sect. 1, of Chap. VI.

The greater part of the Coals in Derbyshire are worked, in what is called the *long way*, or by banks of several yards in length, in which method, under favourable circumstances, but a small part of the seam is left in the ground : but in some places, particularly where the roofs are bad, or the strata which immediately cover the Coal are tender and soft, the method of *posts and stalls*, or leaving large pillars and excavating chambers between them, is resorted to; and even in some extreme cases of bad roofs, mere Galleries are driven in the Coal, and only a small part of it obtained, as at Bore-lane, &c. To describe these different modes of working Coals, in a manner thoroughly intelligible to general Readers, would require several Plates, and swell this part of my Report, already too much extended, to a most inconvenient degree. I shall have occasion to introduce this subject again in Sect. 5, and shall therefore only here further remark, that most of the large Collieries employ large Steam-engines for raising their Water and draining their Works, and smaller Steam-engines, called *Wimseys*, for drawing the Coals out of the Pits.

A List of C*OLLIERIES*[*] *which are or have been in work in Derbyshire, and in such parts of its seven adjacent Counties, as fall within the square of the Map of Strata and Soils facing page 97.*

Abdy, 1¼ *m.* S of Wath in Yorkshire.

Adelphi (or Duckmanton) Furnace, E of Calow, near

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[*] This List, in a different form, viz. arranged according to the Towns near which the Collieries are situate, will be found in Mr. Tilloch's Philosophical and Geological Magazine, vol. 35, p. 453, but without the particulars here given of the several Collieries.

Long Duckmanton, 12th Coal (an Iron Furnace and Mines).

Adlington, S of Lyme Park, 2¼ *m.* S S W of Disley in Cheshire, 3rd Coal.

Aldercar (Ouler-car), near Langley-mill in Heanor (formerly).

Alderwasley, N W of the Village, 1½ *m.* E of Wirksworth, 1st Coal.

Alfreton, S and SW of the Town (formerly).

Alfreton Furnace. See *Somercotes.*

Alton, S. of the Village, 1¼ *m.* E N E of Ashover, 3rd Coal, Crowstone, Brasses.

Alton-grange, S E of Ashby-de-la-Zouch in Leicestershire (formerly).

Ankerbold near Tupton, ¼ *m.* NW of North Winfield, 9th Coal (formerly).

Arbor-lands, 1 *m.* S SW of Eckington, 9th Coal (formerly).

Apperknowl Common, E of Dronfield, 9th Coal (lately).

Armitage (or Mouse-hole Forge), E of Stannington near Sheffield, Yorkshire, 2nd Coal.

Ashby Wolds, Leicestershire. See *Little-worth, Milk-hill, Norris-hill, Sweet-hill, Warren-hill.*

Ash-gate in Brampton, 2 *m.* W of Chesterfield, 7th Coal (formerly).

Aspinshaw, W of Hayfield in Glossop, 2nd Coal.

Apsley, near Bobber's Mill, in Wollaton, Nottinghamshire, under yellow Lime.

Aston-common, SW of the Town, in Yorkshire (formerly).

Attercliff-bridge. See *Washford.*

Attercliff-common, E of the Town, in Yorkshire, 12th Coal? (lately).

Awsworth, ½ *m.* E of the Town, in Nottinghamshire (lately).

Bakestone-dale, N E of Pott Shrigley, Cheshire, 2nd Coal, Brasses.

Ballyfield, E of Hansworth in Yorkshire, 12th Coal ?

Bank, S E of the Village, 1¼ *m.* S W of Holmsfield, 5th Coal (formerly).

Bank-end, N E of Disley in Cheshire, 1st Coal.

Banner Cross. See *Greystones.*

Barlborough-common, W of the Town (formerly).

Barlow-common, ¼ *m.* W of the Town, 8th Coal (formerly).

Baslow, 1¾ *m.* E of the Town, 2nd Coal, Brasses.

Beauvale-abbey, N of Greasley, Nottinghamshire (formerly).

Bee Low, ¾ *m.* E. of Oakmoor Mills, near Alveton in Staffordshire, 1st Coal (formerly).

Beeley Moor, at S end of Chatsworth Old Park, 1 *m.* N E of Beeley, 1st Coal (formerly) Crowstone.

Beggarlee, 1 *m.* N E of Eastwood in Nottinghamshire.

Beighton-field, E S E of Barlborough (formerly).

Belper-gutter, ½ *m.* E of Belper, 2nd Coal (formerly).

Belper Lane-end, 1 *m.* N W of Belper, 1st Coal, Brasses.

Belper Town, N W of the Church, 1st Coal (formerly).

Bemersley-green, near Thursfield, Staffordshire, upper Coals.

Benersley. See *Ilkeston-common.*

Bent, near White Moor, 1 *m.* N E of Belper, 2nd Coal (formerly).

Benty-field, ¾ *m.* E of Codnor, Smithey Coal.

Berley-moor, N of the Village, 2¼ *m.* W of Beighton, 10th Coal.

Berrisford-moor, W of Tupton (near Wingerworth

Furnace, ½ *m.* N W of North Winfield, 9th Coal (formerly).

Berristow, 1 *m.* E N E of South Normanton (lately).

Berristow, ½ *m.* S E of Pott Shrigley in Cheshire, 3rd Coal (formerly).

Biggin, ½ *m.* W of Aston in Yorkshire (formerly).

Biggin, 1 *m.* N N E of Tibshelf (formerly).

Biddulph-hall, N of the Town, in Staffordshire, upper Coals.

Bilborough, N of the Town, in Nottinghamshire, under yellow Lime (formerly, now *Holly-wood*).

Birchen-booth, 1¼ *m.* W of Flash in Staffordshire, 2nd Coal (lately).

Birkin-lane, 2¼ *m.* N E of Ashover, 3rd Coal, Fire-clay, Crowstone (lately).

Blackburn-bank, W of Kimberworth in Yorkshire, 9th Coal.

Black-clough (or Beat), ½ *m.* N W of Flash, in Hartington Parish, 1st and 2nd Coals, a great Fault across the Works, worked lately by a Tunnel for Boats.

Blackfordby, S of the Village, near Ashby-de-la-Zouch, Leicestershire (formerly.)

Blackwell, ¼ *m.* N E of the Town.

Blakelow, S E of Macclesfield, Cheshire, 2nd Coal? (lately).

Blue-hills, N of Bramcote, 3 *m.* S S W of Flash in Staffordshire, 2nd Coal.

Bole Hill, S E of the Houses, 1¼ *m.* S W of Eckington, 8th Coal (formerly).

Bollington, N N E of Macclesfield in Cheshire.

Bore-lane, S of Chisworth, 1¾ *m.* N N E of Mellor, in Glossop, 2nd Coal.

Bow-green, E of Norton, near Bagnall in Staffordshire, upper Coals.

Boythorp, ¼ m S of Chesterfield, 9th Coal.

Brabins, N of Marple Chapel in Cheshire, 2nd Coal.

Bradgate, N of the Village, ½ *m.* N E of Kimberworth, Yorkshire, 10th Coal.

Bramcote, ¼ *m.* N E of Stapleford, Notts (lately).

Bramley-moor, 2¼ *m.* W of Eckington, 8th Coal.

Brampton. See *Little-common.*

Brecks, W of Wickersley, Yorkshire.

Bretby (Bradby), ¼ *m.* NW of Newhall.

Brians-coppy, 1¼ *m.* S S W of Calke (formerly).

Bright-side, N of Attercliff, Yorkshire (formerly).

Brimmington, ½ *m.* WSW of the Town, 8th Coal.

Brimmington-moor, 1 *m.* S of the Town, 6th Coal.

Brinsley (or Brunsley), New or Fenton's, N of the Village, 1¼ *m.* N of Eastwood, in Nottinghamshire.

Brinsley (ditto), Old, E of the Village, 1 *m.* N of Eastwood, in Notts.

Broadhurst-edge, 1½ *m.* S E of Mellor, in Glossop, 3rd Coal, Crowstone.

Broomsteer, in Lancashire, 1½ *m.* NW of Hyde Chapel, Cheshire.

Brown-hills, 1½ *m.* N E of Pelsall, Staffordshire.

Bruerton, S E of Rudgley, Staffordshire, Cannel ?

Bugsworth, NW of Chapel-en-le-Frith, in Glossop, 2nd Coal.

Bull-house, 2 *m.* WSW of Penistone, 2nd Coal.

Burn'd-edge, in Ollerset, SW of Hayfield, 2nd Coal.

Butterley (Car), ⅓ *m.* N E of Ripley (an Iron Furnace and Mines), worked formerly by a Tunnel for Boats.

Butterley-park, 1 *m.* N E of Ripley (over the Cromford Canal Tunnel).

Calow, W of the Village, 2 *m.* E of Chesterfield, 8th and 9th Coals (formerly): E N E, the 11th Coal now getting.

Car-lane, 1 *m.* N E of Ashton-under-line, Lancashire, peacock Coal.

Carsteven. See *Lawn.*

Carter-lane, 1 *m.* N of Pinxton Church (lately).

Car-wood, N E of Oakmoor-Mills, in Staffordshire, 1st Coals (formerly).

Castedge, S E of Jenkin Chapel, 3 *m.* S of Taxhall, in Cheshire, 1st Coal.

Castle Hill, 1 *m.* N of Pentrich, 10th Coal.

Cat-cliff, ¾ *m.* N W of Treton, Yorkshire.

Chapel-house, N E of Marple Chapel, in Cheshire, 2nd Coal.

Chapel-town, S E of Mortomley, near Tankersley, Yorkshire (an Iron Furnace and Mines).

Chatsworth Old Park, 1½ *m.* S E of Baslow, 2nd Coal (formerly).

Chest (near Flash), 3 *m.* E of Wincle Chapel, in Cheshire, 2nd Coal (formerly).

Chesterfield Furnace (E. Smith and Co.), ½ *m.* WSW of the Town, 9th Coal (formerly), an Iron Furnace and Mines.

Chesterfield Town's-end, N W, 9th Coal (formerly), now further N W.

Chevin-side, ¼ *m.* S W of Belper, 1st Coal (formerly).

Childer-play, in Biddulph, Staffordshire, upper Coals.

Cinder-hill or (Middle-field), in Greasborough, Yorkshire (formerly).

Clay-cross, 1¼ *m.* SW of North Winfield, 9th Coal (formerly).

Cliff-bank (or Cliff), E of Macclesfield, in Cheshire, 2nd Coal.

Clough, ¼ *m.* NW of Rotherham, Yorkshire.

Clough-head, ⅓ *m.* W of Foxton (or Fox't), in Staffordshire, 2nd Coal.

Clown, ½ *m.* W of the Town. (See p. 167).

Codnor, nether-park, 1½ *m.* N E of Codnor.

Codnor, upper-park, 1¼ *m.* N N E of Codnor.

Coldwell (or Cawdle), W of Renishaw Hall, ½ *m.* S of Eckington, 10th Coal (formerly).

Cole-Aston, 1 *m.* N E of Dronfield, 8th Coal.

Cole-Orton, E of the Town, Leicestershire.

Combes Moss, 2 *m.* N of Buxton, 1st Coal (formerly. See p. 171).

Combs, S E of Charlesworth, 2½ *m.* SW of Glossop, 2nd Coal.

Compstal-bridge, 1½ *m.* NW of Mellor, in Glossop, 2nd Coal.

Conduit-moor, ½ *m.* E of Aston, in Yorkshire (formerly).

Conisborough, E of the Town, Yorkshire, under yellow Lime (formerly).

Cortworth, 1¼ *m.* E of Wentworth Chapel, Yorkshire.

Cossall, ½ *m.* NW of the Town, in Nottinghamshire (lately).

Cotmanhay-wood, 2 *m.* N of Ilkeston.

Cowpasture, near Beard, in Glossop, 2¾ *m.* NW of Chapel-en-le-Frith, 2nd Coal.

Crabtree, ⅓ *m.* N of Biddulph, Staffordshire, upper Coals.

Crickety, ⅓ *m.* N E of Ashton-under-line, in Lancashire.

Crooks-croft. See *Ponds.*

Crooks-moor, 1½ *m.* W of Sheffield, in Yorkshire, 3rd Coal, Crowstone.

Crowden-clough, 1½ *m.* NW of Woodhead, in Cheshire, 1st Coal (open work).

Crow-gutter, ¾ *m.* E of Ipstone, in Staffordshire, 1st Coal.

Crown-point, 1 *m.* SW of Cheddleton, in Staffordshire, 2nd Coal?

Cunsal-wood, 2⅓ *m.* S S E of Cheddleton, in Staffordshire, 1st Coal.

Cutthorpe, ¼ *m.* S of Barlow, 8th Coal (formerly).

Dale Abbey, N E of the Chapel (formerly, with Iron Furnace and Mines).

Dally-gutter, ¼ *m.* N W of Belper, 1st Coal, Brasses.

Dane-head, Cheshire, 2 *m.* N W of Flash, in Staffordshire, 2nd Coal.

Dane-thurn, Cheshire, ½ *m.* W of the last, 2nd Coal.

Darnall, ¼ *m.* E of Attercliff Town, in Yorkshire, 12th Coal.

Deep-car, 1½ *m.* SW of Wortley Chapel, Yorkshire, 2nd Coal?

Deep-pits (or Wood), 1¼ *m.* S E of Sheffield, in Yorkshire, 8th Coal.

Delph-house, 1 *m.* W of Cheadle, in Staffordshire, 2nd Coal?

Denby, N E of the Church (formerly), 147 yards deep.

Denby-hall, 1¼ *m.* N of Denby Church.

Dennaby, S E of the Village, near Conisborough, in Yorkshire, under yellow Lime?

Denton, in Lancashire, 1¼ *m.* W N W of Hyde Chapel, in Cheshire.

Diamond-hill, 1¼ *m.* W N W of Flash, in Staffordshire, 2nd Coal.

Diglee (or Whaley Moor), 2 *m.* S E of Disley, in Cheshire, 2nd Coal.

Dilhorn, ¼ *m.* N N E of the Town, near Cheadle, in Staffordshire, 2nd Coal?

Dimmings-dale, ¼ *m.* E of Blackwell (formerly).

Dirty Hucknal (near Blackwell), 2¼ *m.* SW of Skegby, in Nottinghamshire.

Donisthorpe, N E of the Village, 1¼ *m.* NW of Measham, Pits 155½ yards deep, Coals 17 feet thick!

Dore, N E of the Town, 2nd Coal, Brasses.

Dronfield, ¾ *m.* NW of the Town (formerly all round it), 8th Coal.

Duckingfield, NW of the Chapel, in Cheshire.

Duckmanton-common, 1 *m.* SW of Long Duckmanton Chapel, 11th and 12th Coals (formerly).

Duckmanton Furnace. See *Adelphi.*

Dungworth, 1½ *m.* NW of Stannington, Yorkshire, 2nd Coal.

Dunkirk, 1¼ *m.* S of Duckingfield, Cheshire.

Dunshill (or Dunsill), 1 *m.* W of Teversall, in Nottinghamshire. (See p. 167).

Dunston, E of the Village, 2 *m.* N N W of Chesterfield, 10th Coal, Smithey Coal.

Eastborough-lane, N E of Macclesfield, Cheshire, 3rd Coal.

East-wall, 2 *m.* N E of Cheadle, in Staffordshire, 1st Coal.

Eastwood, ½ *m.* N of the Town (formerly ¼ *m.* W and N W), in Nottinghamshire.

Eaves, S of Cheadle, in Staffordshire.

Eaves-knowl (Bower's and Longder's Pits), W and SW of New Mills, in Glossop, 2nd Coal.

Eckington, ¾ *m.* SW of the Church, 9th Coal.

Egerton-wood, S E of Beaudesert Park, in Staffordshire.

Elsicar, N of Wentworth Chapel, in Yorkshire (an Iron Furnace and Mines).

Ernocroft. See *Shaw-hay.*

Essington new Colliery, 3 *m.* WSW of Pelsall, Staffordshire.

Essington-wood, 2½ *m.* W of Pelsall, Staffordshire.

Fairbottom, 1¾ *m.* N of Ashton-under-line, in Lancashire.

Falls, in Biddulph, Staffordshire.

Far-lane, S E of the Houses, 1 *m.* NW of Barlow, 7th Coal (formerly).

Ferneyford. See *West-Hallam.*

Ferneylee, W of the Houses, 3¼ *m.* WSW of Chapel-en-le-Frith, 2nd Coal (formerly).

Flash-house, 2 *m.* WNW of Penistone, in Yorkshire, 5th ?

Flowery-field, ¾ *m.* SSE of Duckingfield, Cheshire.

Four-lane-ends, W of the Inn, 1¼ *m.* W of Alfreton, 10th Coal (formerly).

Fox-Ears, ½ *m.* W of Aston, in Yorkshire (formerly).

Foxton-wood, ⅓ *m.* W of the Town, near Froghall in Staffordshire, 1st Coal.

Froghall, ¼ *m.* S E of the Wharf, in Kingsley, Staffordshire, 1st Coal (formerly).

Fullshaw, 2¼ *m.* SW of Penistone in Yorkshire, 2nd Coal, Crowstone.

Furnace-clough, N of Whaley-bridge, 1¼ *m.* E of Disley, in Cheshire, 2nd Coal.

Gander-lane, ¼ *m.* N E of Killamarsh (formerly).

Gap-sitch, ½ *m.* WNW of Taxhall in Cheshire, 1st Coal (formerly).

Garstone, ⅔ *m.* E of the Whiston Copper-works in Kingsley, Staffordshire, 2nd Coal (lately).

Gee, 1¼ *m.* SW of Disley, in Cheshire (lately).

Glass-house Common, 1 *m.* NNE of Whittington, 8th Coal.

Gleedless-common, E and N E of the Village, in Derbyshire and Yorkshire, 2¼ *m.* SW of Hansworth, 8th Coal (formerly).

Gober-hall, near Barnsley, Yorkshire.

Gold-sitch, 1½ *m*. SW of Flash, in Staffordshire, 2nd Coal.

Goscot, ¾ *m*. SW of Pelsall, in Staffordshire, (an Iron Forge, &c.)

Gosley-waste, 1 *m*. SW of Hartshorn (formerly).

Goyte-moss (or Coit), E and N of Moss-houses in Derbyshire and Cheshire, 2¼ *m*. W of Buxton, 2nd Coal.

Grass-hill (or Hasland), S E of Hasland, 2¼ *m*. S E of Chesterfield, 12th Coal, (an Iron Furnace and Mines).

Grass-moor, ½ *m*. W of Temple Normanton, 12th Coal.

Grass-moor (Platt's), 1 *m*. W of Temple Normanton, 11th Coal.

Green-hills, NW of Midgley-gate, 2 *m*. E of Wincle Chapel, Cheshire, 1st Coal.

Greenhill-lane, 2¼ *m*. E S E of Alfreton.

Green-way. See *Throstle's-nest*.

Greenwich, ⅓ *m*. E of Ripley, and 1¼ *m*. NW of Codnor.

Greasley, S of the Church in Nottinghamshire, part under yellow Lime, a Fault across the Works. (See p. 166).

Gresley, ⅓ *m*. W of Church Gresley (lately).

Gresley-hall, N of Castle Gresley in Church Gresley (formerly).

Grey-stones (or Banner's Cross), ¼ *m*. NW of Eccleshall-Barlow, in Sheffield, Yorkshire, 3d Coal.

Hady, ¾ *m*. E of Chesterfield, 8th Coal.

Hag, ¼ *m*. N W of Dale-Abbey (formerly).

Hag-bank, ⅔ *m*. N N E of Disley, Cheshire, 1st Coal, Brasses (lately).

Hagen-field, 1¼ *m*. ESE of Bradfield Chapel, Yorkshire, 1st Coal (lately).

Hague-bank, ¾ *m.* E of Mottram, in Cheshire, 2nd Coal (formerly).

Hallam-bridge (or Nutbrook), 1 *m.* N of Stanton by Dale (formerly).

Hall-fields, ¾ *m.* SW of Newhall.

Hansworth, ⅓ *m.* N of the Town, in Yorkshire, 11th Coal?

Hansworth-woodhouse, W of the Village near Hansworth, Yorkshire, 11th Coal?

Harbour-thorn in Sheffield Park, S E of the Town, in Yorkshire, 8th Coal.

Harrop, SW of Brink, 1¼ *m.* E of Pott Shrigley, in Cheshire, 1st Coal.

Harstoft, W of the Houses, 1½ *m.* N of Tibshelf (formerly).

Harts-hay, 1 *m.* S. of Pentrich, 12th Coal?

Hartshorn, ½ *m.* N E of the Town (formerly), and ¾ *m.* S of the Town (formerly).

Harwood Grange, ¼ *m.* S of the Cupola, 2¼ *m.* E of Beeley (dug open, formerly).

Hasland N E, 1¼ *m.* S E of Chesterfield, 9th Coal (formerly).

Hasland. See *Grass-hill.*

Hay-clough near Midgley-gate, 2 *m.* E of Wincle Chapel, Cheshire, 1st Coal (formerly).

Hay-house, ¾ *m.* SW of Ipstone, in Staffordshire, 1st Coal (formerly).

Hays, 1 *m.* N E of Ashton-under-line, in Lancashire.

Haw-wood, ¼ *m.* S of Greasborough, in Yorkshire.

Hazle-barrow, 2¼ *m.* S S W of Flash, in Staffordshire, 2nd Coal.

Hazles-cross, 1 *m.* W of Kingsley, in Staffordshire, 2nd Coal.

Hazlewell, ½ *m.* W of Barlborough (formerly).

Ipstone, ¼ *m.* S of the Church, in Staffordshire, 1st Coal (formerly).

Kerredge, east-side, ½ *m.* W of Rainow-Chapel, in Cheshire, 3rd Coal.

Kerredge, north-end, 1 *m.* NW of Rainow-Chapel, in Cheshire, 3rd Coal.

Killamarsh nether-moor, ½ *m.* NW of the Church, 12th Coal (formerly).

Killamarsh, old-delph, S of the Church, 13th Coal (formerly).

Kimberworth, S and N of the Village, 1½ *m.* from Rotherham, in Yorkshire, 10th Coal (formerly).

Kimberworth-park, 1¾ *m.* NW of Rotherham, in Yorkshire, 10th Coal.

King-bank, ¾ *m.* N of Mossley, in Lancashire, 1st Coal.

Kingsley-bank, ¾ *m.* N N W of Kingsley, in Staffordshire, 1st Coal.

Knipe, ¾ *m.* S W of Ipstone Church, in Staffordshire, 1st Coal.

Knitaker (or Nitticar), 1 *m.* N E of Barlborough, part under yellow Lime (formerly); a great Fault between this and Pebbley-lane Colliery. (See p. 167).

Knoll (or Stone-pit Shaft), 1 *m.* N E of Ashton-under-line, in Lancashire.

Lane-end. See *Belper.*

Langley, S of the Houses, ½ *m.* E of Heanor (formerly).

Latche, NW of Cutthorn Farm, 2¼ *m.* N E of Wincle Chapel, in Cheshire, 1st Coal (formerly).

Law, in Kirk-Burton, 4½ *m.* WNW of Penistone, in Yorkshire, 3rd Coal?

Lawn (or Casteven, or Kesteven), W of Aston, in Yorkshire (formerly).

Lea, S of the Village, 2½ *m.* S E of Matlock, 1st Coal (formerly).

Lees, round the Village, 1¼ *m.* E N E of Kingsley, in Staffordshire, 1st Coal (formerly).

Lees-hall, 1 *m.* NW of Norton, 5th Coal?

Lime. See *Lyme.*

Limes, ½ *m.* S of Greasley, in Nottinghamshire.

Lings, ¾ *m.* S S W of Temple-Normanton, 12th Coal.

Little-common, in Brampton, 1½ *m.* W of Chesterfield, 8th Coal (lately).

Little-Hallam, N of the Village, ½ *m.* S of Ilkeston (formerly).

Little-worth, ⅓ *m.* S W of Boothorpe, on Ashby-Wolds, in Leicestershire (formerly).

Loco-lane, 1¼ *m.* S E of North Winfield (formerly)

Longhurst-lane, ½ *m.* W of Mellor Chapel, in Glossop, 2nd Coal.

Longway Bank (or Longnor), 1 *m.* N of Alderwasley, in Wirksworth, 1st Coal (formerly).

Lords-hay, 2 *m.* N N W of Pelsall, in Staffordshire.

Lounsley-green, 1¼ *m.* WNW of Chesterfield, 8th Coal.

Lount new (Sir G. Beaumont's), N of Cole-Orton, Leicestershire.

Lount old (Earl Ferrars'), N of Cole-Orton, Leicestershire.

Low-ash, 1¼ *m.* N of Stannington, in Yorkshire, 1st Coal?

Low-wood, 1 *m.* N E of Wentworth Chapel, in Yorkshire.

Lower-Hag, 1 *m.* NW of Dale-Abbey (formerly).

Lower-house (or Cucko-bush Hill), ¾ *m.* W of New Mills, in Glossop, 2nd Coal.

Ludworth, near Compstal-bridge, 1½ *m.* NW of Mellor, in Glossop, 2nd Coal, Crowstone.

Lumsdale, 1 *m.* N E of Matlock, 1st Coal (lately).

Lyme, at SW corner of the Park, 2¼ *m.* SW of Disley, in Cheshire, 4th Coal?

Lyme-park, ¼ *m.* S of Disley, in Cheshire, 1st Coal (formerly).

Macclesfield-common, 1 *m.* E S E of the Town, in Cheshire, 2nd Coal.

Manour, 2 *m.* S E of Sheffield (formerly 1 *m.* E S E), in Yorkshire, 10th Coal.

Massborough-common, 1¼ *m.* W of Rotherham, in Yorkshire, 10th and 11th Coals (formerly), Iron Furnace and Mines.

Meadow-hall, in Kimberworth, N W of Rotherham, Yorkshire.

Measham, N and N E of the Town (formerly).

Measham-fields, 1 *m.* E S E of Measham.

Mexborough, 1 *m.* N W of the Town, in Yorkshire.

Middle Duckmanton, ⅓ *m.* N N W of Long-Duckmanton (formerly).

Midhope-stones, N E of the Village, 2¼ *m.* S of Penistone, in Yorkshire, 2nd Coal.

Milk-hill, 1 *m.* N W of Boothorpe, on Asbby-Wolds, in Leicestershire (lately), good fire Clay.

Mill-house, S E of Eccleshall Barlow Chapel, in Sheffield, Yorkshire, 3rd Coal, fire Clay, and Crowstone.

Miln-hay, 1 *m.* E N E of Heanor (formerly).

Moberley, S S E of Cheadle, in Staffordshire.

Moor-top (or Duckmanton-common), S of Calow, 2¼ *m.* E S E of Chesterfield, 9th Coal (formerly).

Moor top (Top of Moor), near Chinley-hay, 2 *m.* S SW of Hayfield, 2nd Coal.

Morley, ⅓ *m.* E of the Town (formerly).

Morley-park, 1 *m.* S S E of Heage, 9th Coal (an Iron Furnace and Mines).

Moss, ¼ *m.* W of Ringing-low Bar, 2¼ *m.* WSW of Ecclesball Barlow, in Yorkshire, 2nd Coal.

Mossborough-moor, NW of the Village, 1½ *m*. NW of Eckington, 8th Coal.

Mouse-hole. See *Armitage*.

Mouse-trap, WNW of Spire-bent Farm, 3¼ *m*. N E of Wincle Chapel, in Cheshire, 1st Coal (formerly).

Nether-Birchwood, 2 *m*. S E of Alfreton.

Nether-field, 1 *m*. S S E of Beighton, 12th Coal (formerly).

Nether-field, ½ *m*. E S E of Ipstone, in Staffordshire, 1st Coal.

Nether-Hough, E of the Village, 1 *m*. NW of Rawmarsh, in Yorkshire.

Newbold-common, 1¾ *m*. N of Chesterfield, 10th Coal (formerly), now ½ *m*. W of this.

Newbold-field, N of the House, 2½ *m*. NW of Chesterfield, 10th Coal (formerly).

New Brampton (Crawshaw's), 1 *m*. W of Chesterfield, 7th and 8th Coal (formerly).

Newhall, 1 *m*. SW of the Village, in Stapenhill.

Newhall-park, W of the Village, 1¼ *m*. NW of Church Gresley (formerly).

New-Mills. See *Tor-mine*.

New-Pool, in Biddulph, Staffordshire, upper Coals.

New-post, ½ *m*. N of Rainow-Chapel, in Cheshire, 3rd Coal.

Newstead, 1 *m*. S SW of Cheddleton, in Staffordshire, 1st Coal.

Newthorpe-common, 1 *m*. NW of Awsworth, in Nottinghamshire (formerly).

Newton, ½ *m*. E, N E of Blackwell (formerly).

Newton-moor, 1 *m*. SS E of Duckingfield, in Cheshire.

Norbrigs, 1¼ *m*. E N E of Staveley, 12th Coal.

Norbury, SW of Hoo Lane, 2½ *m*. WN W of Disley, in Cheshire, Brasses.

Norris-hill, N and N E of the House, 1 *m.* SW of Blackfordby, on Ashby Wolds, in Leicestershire (formerly).

North-end. See *Kerredge.*

Norbury, W of the Houses, 1 *m.* NW of Flash, in Staffordshire, 1st Coal (formerly).

Nuthall, on the S side of the Park, 1 *m.* N N W of Bilborough, Notts, under yellow Lime, 160 yards deep! (formerly).

Oakerthorpe, E of the Village, 1 *m.* SW of Alfreton, 12th Coal?

Oakthorpe, E of the Village, ⅔ *m.* N of Measham (formerly).

Old-hall-wood, ⅔ *m.* WSW of Mellor Chapel, in Glossop, 2nd Coal (formerly).

Openwood-gate, ⅔ *m.* S S E of the Houses, 1¼ *m.* S E of Belper, 3rd Coal (formerly), Crowstone.

Orgrave, ¾ *m.* N E of Hansworth, in Yorkshire (lately).

Over-Hough, NW of the Houses, 1¼ *m.* NW of Rawmarsh, in Yorkshire.

Over-thorp, ½ *m.* SW of Killamarsh, 12th Coal (lately).

Oneston (or Ounston), S E of the Village, 1½ *m.* S E of Dronfield, 8th Coal (formerly).

Owlcotes. See *High-house.*

Packington, ¼ *m.* SW of the Town, in Leicestershire (formerly).

Palterton, W of the Houses, 1¼ *m.* SSW of Bolsover (formerly). (See p. 167).

Park, 2 *m.* NW of Mossley, in Lancashire.

Park-furnace, ⅘ *m.* N E of Sheffield, in Yorkshire, 10th Coal (formerly), an Iron Furnace.

Park-gate, 2 *m.* S of Wentworth Chapel, 10th Coal (formerly).

Parkins-wood, near Chapel-Town, in Yorkshire.

Parsons-field (Wolf's), ¼ *m*. N of Dilhorn, in Staffordshire, 2nd Coal?

Paw-hill, 2¼ *m*. SW of Penistone, in Yorkshire, 2nd Coal.

Pebbley-lane (Rode's), W of the Inn, 1¼ *m*. N of Barlborough (formerly); a great Fault between this and Knitaker Colliery. (See p. 167).

Pelsall, E of the Church, 2 *m*. N E of Bloxwick, in Staffordshire.

Penny-hole, 1¼ *m*. N N W of Flash, in Staffordshire, 1st Coal.

Pentrich, ½ *m*. S S E of the Town, 12th Coal?

Perkins, ½ *m*. E S E of Newhall (formerly).

Pidgeon-bridge, ¾ *m*. S W of Aston, in Yorkshire (formerly).

Pilsley-lane, 1¼ *m*. S S E of North Winfield (formerly).

Pingle, ⅓ *m*. N W of Dale-Abbey (formerly).

Pinxton, ½ *m*. N E of the Church, and ⅓ *m*. E S E (formerly, also S W and N W of the Church).

Pistern, 1¼ *m*. N N W of Smithsby, 1¼ *m*. from Hartshorn (formerly).

Plaistow green, S E of the Houses, 1 *m*. N N E of Crich, 1st Coals (formerly).

Polesworth, 4 *m*. E of Tamworth, in Warwickshire.

Ponds (or Crooks-croft), in Sheffield Town, E of the Sheaf River, Yorkshire, 8th Coal.

Pott-hall, ¼ *m*. N E of Pott Shrigley, in Cheshire, 3rd Coal (formerly).

Poynton, S E of the Village, 2¼ *m*. W of Disley, in Cheshire.

Quarnford, W of the House, 2¼ *m*. E of Wincle Chapel, in Cheshire, 1st Coal (formerly).

Rabbit-hole, S of Staley Bridge, 1¼ *m*. E N E of Duckingfield, in Cheshire, 2nd Coal.

Rake-edge, S of Lees, 1¼ *m.* S E of Kingsley, in Staffordshire, 1st Coal.

Rainow-low, ¼ *m.* N of Rainow Chapel, in Cheshire, 3rd Coal.

Rawmarsh, N W of the Town, in Yorkshire.

Red-acre, near Lyme-park, 2¾ *m.* S W of Disley, Cheshire, 4th Coal ?

Riddings, S E of the Village, 2¾ *m.* S E of Alfreton.

Riley-clough, on Macclesfield Common, 1 *m.* E of the Town, Cheshire, 2nd Coal, Brasses.

Ringing-low-bar, S W of the Inn, 2¼ *m.* N W of Dore, 2nd Coal, Crowstone.

Ripley, S W of the Village, 1½ *m.* S S E of Pentrich (lately).

Robinets, ¾ *m.* E of Cossall, in Nottinghamshire.

Robins-clough, N E of Midgley-gate, 2½ *m.* E of Wincle Chapel, in Cheshire, 2nd Coal (formerly).

Roby east-field, 1 *m.* E of Denby Church (lately).

Roby west-field, ¾ *m.* N W of Denby Church.

Ross-bank, ¾ *m.* S of Lees, in Kingsley, Staffordshire, 1st Coal.

Rotches, 1¼ *m.* W of Mossley, in Lancashire.

Round-hole, 1 *m.* N E of Church Gresley (lately).

Royds-moor, ½ *m.* S E of Whiston, in Yorkshire (formerly). (See p. 169).

Salters-sitch, S W of Ouler Bar, 1¾ *m.* W of Holmsfield, 2nd Coal (formerly), Crowstone.

Sandy-gate, N E of Fullwood, 2½ *m.* W of Sheffield, 1st Coal (lately).

Score-wood, at the E end of Duckingfield Town, in Cheshire, peacock Coal.

Scout-mill W, ¾ *m.* S of Mossley, in Lancashire, 1st Coal (dug open, formerly).

Shafferlong, ¾ *m.* S S W of Cheddleton, in Staffordshire, 2nd Coal.

Shallcross (or Shawcross), E of Taxhall, 2¼ *m.* WSW of Chapel-en-le-Frith.

Shaw (or Sham), 1 *m.* W of Cheadle, in Staffordshire.

Shaw, 1¼ *m.* N N E of Cheadle, in Kingsley, Staffordshire, 2nd Coal.

Shaw-hay (or Ernocroft), 1¼ *m.* N of Mellor, in Glossop, 2nd Coal.

Sheffield-park. See *Deep-pits*, *Manour*, *Park*, and *Ponds*.

Shilo, N W of Dirty Hucknal, 2 *m.* WSW of Skegby, in Nottinghamshire.

Shipley, 1 *m.* S S E of Heanor, Brasses.

Shirland, ½ *m.* S of the Town, 11th Coal.

Shrigley-fold, N E of Macclesfield, in Cheshire, 3rd Coal.

Shuttlewood-common, 1½ *m.* N of Bolsover (formerly). See page 167.

Silkstone (Parker's Furnace), in Yorkshire (formerly).

Simondley, SW of the Village, 2 *m.* SW of Glossop, 2nd Coal.

Simonfield, S E of Park Hall, 1 *m.* S E of Smalley (formerly).

Skegby, 1 *m.* W of the Town, in Nottinghamshire, part under yellow Lime. See p. 167.

Slack-fields, ½ *m.* E of Horsley, 4th Coal.

Smalley, ¾ *m.* N N E of the Town (formerly).

Smalley-common, ¾ *m.* S SW of the Town (formerly).

Smelting, S E of Ringing-low-bar, 1¾ *m.* WSW of Ecclesball Barlow, in Yorkshire, 2nd Coal, Brasses.

Smithy-houses N E, ½ *m.* NW of Denby Church (formerly).

Smithy-moor, SW of Stretton, 1¼ *m.* N NW of Shirland, 9th Coal (formerly), Marley Bind.

Smithy-wood-engine, 1 *m.* E of Chapel-Town, in Yorkshire.

Somercotes, E of the Village, 2¼ *m.* S E of Alfreton.

Somercotes-furnace (or Alfreton-furnace), S E of the Village, 2½ *m.* S E of Alfreton, an Iron Furnace and Mines.

South Normanton, ½ *m.* S of the Church.

Southwood, 2 *m.* N N E of Ashby-de-la-Zouch, in Leicestershire (formerly).

Spinkhill-common, E of the Village, 1¼ *m.* NW of Barlborough, 12th Coal.

Spons, N E of Brink, 1½ *m.* E of Pott Shrigley, in Cheshire, 1st Coal (formerly).

Spons-moor, near Lyme Park, 1¼ *m.* N E of Pott Shrigley, in Cheshire, 2nd Coal, Crowstone.

Stainborough-park, 2 *m.* W of Worsborough, in Yorkshire.

Stanage, 1 *m.* W N W of Stanage-pole, 4¼ *m.* W of Fullwood Chapel, in Yorkshire, 1st Coal.

Stanage-pole, S W of the Pole, 1½ *m.* N N E of Hathersage, 1st Coal (formerly).

Stanfrey (or Horsecroft), E of the Houses, 2¼ *m.* N N E of Bolsover (lately). See p. 167.

Stanley-common, 1 *m.* NW of West Hallam (formerly).

Stanton, at S E end of Stanton Ward, 1¼ *m.* W of Newhall.

Stanton-by-Dale, or Nutbrook. See *Hallam-bridge.*

Stanton-Harold, S E of the Church, in Leicestershire.

Staveley, 1 *m.* SW of the Town, 12th Coal.

Stileshutt, ¼ *m.* SW of Foxton, near Ipstone, in Staffordshire, 1st Coal.

Stock-bridge, 1¼ *m.* N of Bolterstone Chapel, in Yorkshire, 2nd Coal.

Stone-gravel, ¼ *m*. N of Chesterfield, 9th Coal; also ½ *m*. SW of this.

Storrs, 1¼ *m*. NW of Stannington, in Yorkshire, 2nd Coal.

Stretton, E of the Village, 2 *m*. N N W of Shirland, 9th Coal.

Stubbing-lane, 1½ *m*. NW of Rawmarsh, in Yorkshire.

Stubley, 1¼ *m*. N W of Dronfield, 8th Coal (formerly).

Styperson, N W of Pott Shrigley, in Cheshire.

Sudale. See *Sudbrook*.

Sudbrook (or Sudale), ⅔ *m*. S S E of Barlow, 8th Coal.

Sutton (in Scarsdale), ¼ *m*. NW of the Church, 12th Coal (formerly).

Sutton-common (ditto), ⅔ *m*. NW of the Church, 10th, 11th, and 12th Coals (formerly).

Swadlingcote, ⅓ *m*. NW of the Village, ½ *m*. S S E of Newhall, Smithy Coal.

Swallow-nest, 1 *m*. SW of Aston, in Yorkshire, 12th Coal.

Swallow-wood-nook, 1½ *m*. S E of Wentworth Chapel, in Yorkshire.

Swanco, 2 *m*. N E of Macclesfield, in Cheshire, 3rd Coal?

Swanwick-delves, E S E of the Houses, 1¼ *m*. S S E of Alfreton (formerly).

Swanwick-green, 1½ *m*. S S W of Alfreton, Brasses (formerly).

Sweet-hill-oak, ¼ *m*. S S E of Boothorpe, on Ashby-Wolds, Leicestershire (lately).

Swepston, E and N W of the Town, in Leicestershire (formerly).

Swetley (Lowe's), ¼ *m*. N N E of Dilhorn, in Staffordshire.

Swinney, ½ *m.* N E of Belper Bridge, 1st Coal (formerly).

Tankersley-park, S of the Town, in Yorkshire.

Tansley-green, 1¼ *m.* W of Matlock, 1st Coal (formerly).

Tapton, ¼ *m.* S of the Hall, N E of Chesterfield, 8th Coal (formerly).

Thatch-marsh, in Hartington, 2 *m.* SW of Buxton (Works 2¼ *m.* long), 1st Coal, Brasses; will soon be worked by a rail-way Tunnel.

Thickwood, NW of Ouler Bar, 1¼ *m.* WNW of Holmsfield, in Dronfield, 2nd Coal (formerly).

Thorncliff, N of Chapel Town, in Yorkshire, an Iron Furnace and Mines.

Throstles'-nest (or Green-way), 2 *m.* E of Macclesfield, in Cheshire, 2nd Coal.

Tibshelf, ⅓ *m.* S of the Church.

Ticknall, at SW end of the Town (formerly).

Tinsley-park, 1¾ *m.* E of Attercliff, in Yorkshire (formerly).

Todwick-moor, ½ *m.* NW of the Church, in Yorkshire (formerly).

Tor-mine, ⅓ *m.* SW of New Mills, in Glossop, 2nd Coal (formerly).

Town-field, 1 *m.* NW of Heage, 1st Coal (formerly).

Trap-lane, ½ *m.* NW of Eccleshall Barlow Chapel, in Sheffield, Yorkshire, 3rd Coal.

Troway, S of the Village, 2½ *m.* E S E of Eckington, 8th Coal, Smithy Coal.

Trowel-moor, 1 *m.* W of Wollaton, in Nottinghamshire.

Tupton-green, 1 *m.* NW of North Winfield, 9th Coal.

Wadsley, W of the Village, 1½ *m.* N N E of Stannington, in Yorkshire, 2nd Coal, Crowstone.

Wales, ½ *m.* SSE of the Town, in Yorkshire, over the Chesterfield Canal Tunnel (formerly).

Walton, N N E of the Hall, 1¼ *m.* SW of Chesterfield, 8th Coal, and S W of the Hall.

Warps-moor, S SW of New Mills, 1¼ *m.* E N E of Disley, in Cheshire, 2nd Coal (formerly).

Warren-hill-furnace (or Ashby Wolds), 1 *m.* WNW of Over Seal, in Leicestershire, an Iron Furnace and Mines; the deepest Pits and thickest Coal in all this list, 202 yards deep and 21 feet thick!

Washford (or Attercliff-bridge), at SW end of Attercliff, near Sheffield, in Yorkshire, 11th Coal.

Water-field, E of Stanton, 1¼ *m.* WSW of Newhall (lately).

Wath-wood, ¾ *m.* S of Wath upon Dearn, in Yorkshire.

Waverton (or Warton), 5 *m.* E of Tamworth, in Warwickshire.

Wentworth-park, S of the Pillar, 2¼ *m.* S of Wentworth Chapel, in Yorkshire (formerly).

Werneth-low, 1¼ *m.* S of Hyde Chapel, in Cheshire, 2nd Coal (formerly).

Westfield (or Sough), ⅓ *m.* SW of Barlborough (formerly).

West-Hallam (or Ferneyford), near Lewcote-gate, 1 *m.* N E of West-Hallam.

West-Hallam windmill-hill, ½ *m.* NW of the Town, and also ⅓ *m.* E of it (formerly).

Westwood, E of Wortley Chapel, in Yorkshire.

Wetley-moor (or Handley-Ease), 2¼ *m.* SW of Cheddleton, in Staffordshire.

Whaley Moor. See *Diglee.*

Wheatcroft, in Crich, NW of the Village, 1st Coal (formerly).

White-holly-coppy, S of the Houses, 1½ *m.* S of Ticknall (formerly).

Whiteshaw, 2½ *m.* SSW of Flash, in Staffordshire, 2nd Coal.

Whitfield, 1 *m.* N E of Norton, in Staffordshire, upper Coals.

Whitley-wood, ¾ *m.* W of Eccleshall Barlow, in Sheffield, Yorkshire, 3rd Coal, Periwinkles in Pyrites?

Whittington-moor, ⅔ *m.* S E of the Church, 10th Coal.

Wigwell, N E of the Houses, 1¼ *m.* E N E of Wirksworth, 1st Coal (formerly).

Wildens-mill, ⅔ *m.* WNW of Brimmington, 8th Coal.

Wilders-green, NW of the Houses, 1¾ *m.* W of Barlow, 7th Coal (formerly).

Wilnecote, S E of Tamworth, in Warwickshire.

Windy-bank, ¾ *m.* W of Mossley, in Lancashire, 2nd Coal.

Wingerworth-furnace, N of Woodthorp, 3 *m.* S of Chesterfield, 7th Coal (formerly); an Iron Furnace and Mines.

Wingerworth-park, NW of the Hall, 2 *m.* S of Chesterfield, 9th Coal.

Wollaton, 1¼ *m.* WNW of the Town, in Nottinghamshire, part under yellow Lime.

Wooden-box, E of Swadlingcote, 1¾ *m.* S E of Newhall (lately).

Wood-field (or Park-gate), ⅓ *m.* N of Newhall (formerly).

Woodhall-moor, S of the Village, 1 *m.* SW of Harthill, in Yorkshire (formerly).

Woodhead (Mr. Lee's), ¾ *m.* N E of Cheadle, in Staffordshire.

Woodhouse (or Stubley), ¼ *m.* SW of the Village, 1¾ *m.* W of Dronfield, 8th Coal.

Woodhouse-lane, ½ *m.* SW of Smalley Church (formerly).

Woodley, 1¾ *m.* SW of Hyde Chapel, in Cheshire.

Wood-nook, 1¼ *m.* WNW of Sutton, in Scarsdale, 9th Coal (formerly).

Woodthorp, W of Tupton, 1¼ *m.* WNW of North Winfield, 7th and 8th Coal (formerly).

Woodthorpe, S E of the Houses, 1½ *m.* SW of Hansworth, in Yorkshire, 10th Coal.

Woodthorp, N of the Houses, 1¼ *m.* E of Staveley, 12th Coal (formerly).

Woodwards-Close, S of Swadlingcote, 1 *m.* N E of Church Gresley (lately).

Worsborough, ⅔ *m.* N N E of the Town, in Yorkshire.

Worth, 2¼*m.* WSW of Disley, in Cheshire.

Wyrley-bank, 2¼ *m.* NW of Pelsall, in Staffordshire.

In the above List, which contains the Names and Situations of about 500 Collieries, such as are not in work, are distinguished by words to that purpose in parentheses; where no County is mentioned to the names of places, here, as in all other parts of this Report, Derbyshire is to be understood. By the terms 1st Coal, 2nd Coal, &c. it must not be understood, that these are the only Coal-seams which occur, for I mean by these expressions in the List, " in the 1st Coal Shale," " in the 2nd Coal Shale," &c. that is, in the series of Argillaceous Strata which lay between the 1st and 2nd Grit Rock, between the 2nd and 3rd Grit Rock, &c. (see p. 161); always remembering, that the Grit Rock of the corresponding number, lays under, or is the floor of, its Coal Shale. A considerable number of Coal-seams, of different thicknesses, lay between some of my Grit Rocks; so, that when I say the 8th or 9th Coal, &c. at different Collieries, it must not be understood that the very same seams are always intended, but only seams in the 8th or 9th Coal Shale, &c. respectively. After a thorough collation of the vast body of materials which I possess, and what I hope further to collect, I expect to be able to define more particularly, in my Mineral History, which are the seams working, or worked, in each Colliery. Where no number of Coal is mentioned, it is because I have not yet completed my observations in that part; and where any doubt still remains, I have added a note of interrogation to indicate it. Where the "upper" series of Coals, or upper Coals, is mentioned, it refers to the Coal Series above the yellow Lime, mentioned pages 132, 159, 174 and 179. Black-clough Colliery, in the above List, presents a third remarkable instance of the Colliers working across a Fault into a different Coal, without being aware, as they pretended however, that they had got into a different part of the Series: Greasley and Knitaker are the other instances; see p. 169. I beg here to address myself to Coal-owners, Coal-masters, Agents, and Sinkers of Pits, in the districts comprised in my Map, and earnestly to entreat of them to write, or cause to be written down, the thickness of each Measure sunk through, in every new Shaft which is dug, and to preserve the same, as important documents to themselves and others; and to those who will favour me with copies of such accounts, carefully made, and accurately describing the situation of the Pits, I shall feel greatly obliged, and be ready to return the obligation, by the communication of any similar information in my power.

[illegible]

The establishment of a *Geological and Mineralogical Society* in the district, for collecting and methodizing such accounts, and arranging and preserving Specimens of the several Measures proved in sinking Shafts, Quarries, Wells, &c. and of the Organic Remains which they contain, could not fail of proving highly beneficial to Science, and to the interest of Mining, at the same time, that it furnished a most rational and delightful amusement to the Members.

I have mentioned above, several places, where Iron Furnaces and Mines accompany the Collieries; and below is a List of Places where I have observed *Ironstone Rakes*, either now or formerly worked.

Alfreton.
Ashby Wolds, Leicestershire.
Ash-gate, in Chesterfield.
Attercliff, Yorkshire.
Bagthorpe, Notts.
Berley-moor, in Eckington.
Birchett, in Dronfield.
Blackfordby, Leicestershire.
Bramley, in Eckington.
Brampton, in Chesterfield.
Brimmington, in Chesterfield.
Butterley, in Pentrich.
Calow, in Chesterfield.
Chapel-town, Yorkshire.
Clay-cross, in North Winfield.
Codnor-park, in Heanor.
Cole-Aston, in Dronfield.
Dale-Abbey.
Darnall, near Sheffield, Yorkshire.
Eckington.
Grass-moor, in Chesterfield.
Greasborough, Yorkshire.
Green-hill Lane, in Alfreton.
Hady, in Chesterfield.
Hasland, in ditto.
Heage, in Duffield.
Henmore, in North Winfield.
Higham, in Shirland.
High-lane, in Eckington.
Hill-top, in Dronfield.
Hollinwood-common, in Staveley.
Holmsfield, in Dronfield.
Ilkeston.
Inkersall, in Staveley.
Killamarsh, in Eckington.
Kimberworth, Yorkshire.
Little-worth, near Bootherpe, Leicestershire.
Long-Duckmanton.
Massborough, Yorkshire.
Morley-park, in Duffield.
Mortomley, Yorkshire.
Mossborough, in Eckington.
Nether Birchwood, in Alfreton.
Newmarket, in North Winfield.
Oneston, in Dronfield.
Over Birchwood, in Alfreton.
Pentrich.
Pinxton.
Pye-bridge, in Alfreton.

Renishaw, in Eckington.
Riddings, in Alfreton.
Ripley, in Pentrich.
Sheffield-park, Yorkshire.
Shipley, in Heanor.
Shirland.
Somercotes, in Alfreton.
South-Normanton.
Spinkhill, in Eckington.
Stanfrey, in Bolsover.
Stanton-by-Dale.
Staveley.
Sutton, in Scarsdale.
Swanwick, in Alfreton.
Tankersley, Yorkshire.
Tapton, in Chesterfield.
Troway, in Eckington.
Tupton, in North Winfield.
Wales, Yorkshire.
Walton, in Chesterfield.
Wentworth Chapel, Yorkshire.
West-Hallam.
Whittington.
Wingerworth, in Chesterfield.
Woodthorp, in North Winfield.
Worsborough, Yorkshire.

The Ironstone above, is principally in flat balls, laying often, like paved floors in the Bind or Shale, in which it is found; but there are a few thin beds or strata of it. Several of the Coal Shales produce Ironstone Beds, which at their basset or out-crop are called Rakes, the workings of which, can often be traced through the fields for many miles together: it will be a particular object, to shew all of these in my large Map, and to describe the different Ironstone Rakes in my Mineral History; what is done above must suffice here, except what may occur under the head of *Iron*, in the next Section of this Chapter.

Many of the Coal-seams in Derbyshire, and its environs, have considerable quantities of Brasses, or Drosses, in them, which are lumps of Iron Pyrites; these are selected out at several Collieries, and sold to the makers of *Copperas*, green Vitriol, or Sulphate of Iron, of which there are two Manufactories at Brimmington, one in Dore (Barber-Fields), one at Newhall, and one in Staveley. I have noticed these Brasses, in some instances, in the above List of Collieries, and below is the List of some places where I have noted *Brasses*, in the Coal-districts of my Map, viz.

Alton, in Ashover.
Barlow, in Staveley.
Belper.
Buxton (Thatch Marsh).
Disley, Cheshire.
Dore, in Dronfield.
Dronfield.
Eccleshall Barlow, Yorkshire.
Heanor.
Macclesfield-common, in Cheshire.
Norbury, Cheshire.
Port-Shrigley, Cheshire.
Shipley, in Heanor.
Swanwick, in Alfreton.
&c.

The following is a general List of the Minerals, and articles produced by the valuable *Coal-districts* which I am treating of (coloured Green), viz.

Argillaceous Sand-stone, see p. 161.
Bakestones (of Shale).
Bind, of several kinds.
Black Chalk (Bind or Shale).
Brasses (Pyrites). See above.
Brick Clay.
Cank-stone.
Cannel-Coal (Sparkle, Branch, Splint).
Chalybeate Springs.
Clay.
Clunch.
Coals.
Crowstone (Ganister). See p. 180.
Crozling Coals (Smithy).
Fire Clay.
Fire Stone (Pot-stones).
Freestone.
Grind-stones.
Gritstone.
Hard Coal (Stone Coal).
Hones (Ironstone).
Ironstone. See p. 217.
Marble (Muscle Ironstone).
Marl (Bind).
Micaceous Gritstone.
Ochrey Springs.
Paving-stone (flags).
Peacock Coal.
Pipe Clay (White Potters').
Potters' Clay (white, yellow, Red).
Pyrites (Brasses).
Sandstone.
Shale.
Slate grey (micaceous grit).
Soft Coals (Sleck).
Sulphureous Springs.
Tile Clay.
Whetstones.

Some of the above articles will be more particularly noticed in the next Section. It remains only to mention, that a careful scaleing of my large Map, shews, that the three lowest Coal Shales and their covering

Grit Rocks, which are coloured light Green in the Map, extend in Derbyshire over 60,000 acres of its surface, and the remainder of its Coal-fields, coloured dark Green, over 130,000 acres, making in the whole 190,000 acres of Coal-measures in Derbyshire.

7. *Grit-stone and Shale Strata.*

I come now to speak of two principal Strata, which occupy the parts in the Map facing page 97, and of the Section, or Internal Plan, in *Plate* V. facing page 129, which are coloured Purple: these I have separated from the Coal-measures, in this concise abstract of the Derbyshire Strata, because they contain no seams of Coal of the least value; they otherwise possess the characters of Coal-measures, in the numerous Vegetable impressions, in a Coaly state, which they contain; occurrences which are not to be expected in the Strata below these, or in any of those which cover the Red Marl (of which a concise account has been given, page 111), in which Animal remains so much abound.

1st *Grit Rock*.

The uppermost of the strata coloured Purple, is the 1st or *Millstone Grit* Rock, which by its thickness and its hardness, and truly indestructible properties, gives rise to the greater part of the Silicious Rock Scenery in Derbyshire, and the adjacent parts of Staffordshire, Cheshire and Yorkshire. In several places this Rock has been proved to be 120 yards thick, composed for the greater part, of a very coarse-grained white, yellowish or reddish Free-stone, which is easily worked, considering the extreme hardness of its particles, and its great durability, which appears to me superior, to that of any Free-stone which I have seen used in England. What

are

known all over England by the name of *Peak Mill-stones*, are from this stratum, and though formerly these were dug and prepared from various parts of the Stratum, from Belper northwards, yet now, few if any Millstones are made, but at Old-Booth Edge, and other places near Nether Padley in Hathersage, in a very inaccessible part of the County: principally, as it seems to me, because here, by long working, a superior part of the stratum has been reached, to what is generally met with on the surface: for the fact is, that fine blocks of this Rock, of every size that can be wanted, are so plentifully met with, loose and above ground, that any thing like a Quarry in it is almost unknown, except in Hathersage.

At Old-Booth Edge the *Peak Millstones* now usually made, are from 2 ft. 3 in. diameter and 8 in. thick, to 5 ft. 7¼ in. diameter and 17 in. thick: the prices are, a pair of 5 ft. stones 10 guineas, 5 ft. 4 in. at 12 guineas, 5 ft. 8 in. at 14 guineas; rising a guinea a stone every $3\frac{6}{10}$ in. in diameter. Small stones for paint-grinding, or for exportation, 4 ft. 6 in. in diameter, at 8 guineas; extra stones 6 ft. diameter, at 16 guineas.

The places where Peak Millstones were formerly made, were, Alderwasley in Wirksworth, Bamford-Edge in Hathersage, Baslow, Curbar near Baslow, Eyam Woodlands, Hallam in Sheffield in Yorkshire, Harston in Matlock, Kinder Scout E of Hayfield, Lea in Ashover, and Mole-copt S of Congleton in Cheshire; these last, from one of the coarse Grits of the upper Coal-series, mentioned page 179.

Some of the beds of this 1st Grit Rock, which have usually spherical stains in them of a light Red colour, are perfectly infusible, and form the best *Fire Stone* which is known, for lining the Hearths of Iron-Furnaces and others, where an intense heat is kept up. Roches Quarry, near Upper Town, in Ashover, is particularly famous for these Fire Stones, which are also got, at Lums Dale in Matlock, Overton in Ashover, Revedge Hill in Warslow, Staffordshire, Ridgeway near Belper N, Spout in Wirksworth, Stanton Moor near Darley, Tagstones near Oughty Bridge in Bradfield Chapel, Yorkshire, Wirksworth-Moor, &c.

The upper beds of the 1st Grit Rock are often thin, and capable of further division, so as to make excellent Paving-stones or Flags, and even Slate for covering Buildings. See the general Lists of the Quarries of these, in the next Section.

In a Geological point of view, this 1st or lowest regular Grit Rock, is very important, on account of the great length that its basset-edge can be traced with scarcely any interruption, within the limits of my Map, in the form almost of a lengthened Horseshoe, terminating at its two ends against the great east and west or Derbyshire Fault, which I have already described pages 146 and 165, and including within and beneath it, the great or Limestone Shale, and the Limestones and Toadstones, whose descriptions are to follow, and having Coal-measures upon and without it. As this Rock is one of the finest and best marked features of the great Derbyshire Denudation, I shall mention the places, in order, which form the irregular Horseshoe-like figure, above described. Commencing at the zig-zag Fault a little N W of Little Eaton Town near Derby, it proceeds through or near to Duffield-Bank, Makeney, Milford (where it crosses the Derwent), Chevin Hills, Milnhay, Alport-Hill at Spout, E of Brayfield, Wigwell, Barehill Edge and Stone-house Rocks near Cromford, on both sides of the Devil's Bowling-alley (see page

66),

66), W of Watstanwell-bridge, W of Alderwasley Forge, at Toad-moor Bridge (where it again crosses the Derwent), Ridge-way, E of Bull-bridge, E of Fritchley, W of Park Lane-head, E of Plaistow-green, Wakebridge, Upper Holloway, W of Lea, Harston-Hill, Riber-Hill, Tansley, Lums Dale, Matlock-Bank, Over-Hackney, Toad-Hole Mills, Stoncliff, Little Rowsley, Fallange, E of Beeley, E of Hill-top, E of Chatsworth-House, W of the Robin-Hood in Baslow, on both sides of Barbrook-Dale, E of Curbar, E of Froggat, E of Toad-hole, E of Nether Padley, on both sides of Burbadge Dale, E of Upper Padley, E of Booth, Upper Burbadge Bridge, N of Hathersage Cupola, Stanage, N E of Bamford*, E of Shuts Ding Bank, E of Grain Foot, ¼ *m.* E of Darwent-chapel, Lost-lad Hill (No. 9†), High Stones (No. 4), in Yorkshire, Crow Stones, Horse Stones (No. 1), Dean-head Stones (No. 6), Barrow Stones (No. 7) in Derbyshire, Grinah Stones (No. 8), Blakelow Stones (No. 9), Wain Stones (No. 10), Shelf Stones (No. 11), Glossop Low, Shire-hill ¼ *m.* S E of Glossop, Glead Hill (No. 14), E of Car-meadow, Whimbury-Knots (No. 15), W of Kinder Houses, South-head Tor (No. 19), S of Chinley Head, Chinley-churn (No. 20), Eccles' Pike, 1¼ *m.* W of Chapel-en-le-Frith, Tunstead-Lane, W of Thorney-Ley, W of High Leys, W of White Hall, Beet-House, Thatch-marsh, W of North Axe-Edge Hill, South Axe-edge Hill (No. 32), Flash in Staffordshire, Flash-bottom, Ramshaw-Rocks (No. 34), N of Bramcote,

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* Bamford-Edge is sunk and tilted, to a Fault, which ranges from Shatton, and passes E of Bamford, in a direction for Moscar-house; this occasions a break, in thus tracing the continuity of the 1st Grit Rock.

† These numbers, refer to the Map of *Ridges*, facing page 1, and to the Alphabetical List of *Hills*, page 16.

High Roches (No. 35), Hanging-stone Hill ¼ *m.* N of Swithamley Hall, in Staffordshire. In proceeding here SW, we find, owing to the horizontality of the Measures in a SW and N E direction, and the excavation of the wide Vale or district called Leek-Frith, the 1st Grit Rock is carried off, and the Shale is laid bare, for an interval of about 1½ *m.* to Heacon-low (N of the Village) an issolated cap or Hummock of the 1st Grit; an excavated Vale branching from the above, S of Heacon, separates this Hummock about ½ *m.* from Cocknell Hill, S W of Heacon; whence we can again pursue the 1st Rock, for some miles southward, viz. between Rudyard Hall and the great Canal Reservoir of that name, which is situate in the 1st Rock, 1¼ *m.* W of Leek Church, W of Leek Poor-house, E of Caleton near Endon, ¼ *m.* W of Cheddleton. Here again, owing to a great Fault, which ranges nearly N and S, and raises the Measures considerably on the E side, and which raised Measures, being denudated, the Shale occupies the surface; and the 1st Grit is missing for about 2 *m.* to Wetley Rocks (No. 5), whence proceeding first N E and then S E, until N E of Cunsal, when we find the 1st Grit Rock crossing the Churnet River, with a S E dip, and proceeding thence to Mossleigh and Sharp Cliff, and Ipstone Edge Hills (Nos. 6 and 7), N of the Town; to Pike Low (No. 11), E of Blazing-star, and E of Bee Low (No. 15); between which Hill and Ramsor Village, the further progress of this 1st Grit Rock on the surface southward, is prevented, by the Great Derbyshire Fault*, which has let down the Measures south of it (or rather those north of it have been lifted) so enormously, compared with the present surface, that the Red Marl is here found, under a vast thickness of quartz Gravel!

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* Described page 146.

At our commencement or other end of this 1st Rock, at Little Eaton, the derangement by the zig-zag Fault is such, that the Salmon-coloured Grit Rock of Rotherham, as I imagine (perhaps the 16th, see page 169), abuts against it: and wherever in the kind of Horseshoe above described, the 1st Grit is wanting, the same Shale which appears all round within it, intervenes in the gaps, and shews plainly, that denudation only, has occasioned these gaps; which are circumstances most fortunate, for our acquiring a satisfactory knowledge of the immense central denudation, which has laid bare the great Mineral Limestone tract of Derbyshire and Staffordshire.

Within the part of the Map which is coloured Purple, and within the Horseshoe figure above described, there are more than 20 issolated patches or Hummocks of the 1st Grit Rock, from under which the great Shale beneath it, can be seen basseting on all sides: and since these, as I some time ago observed in the Philosophical Magazine, vol. 33, page 258, present the most satisfactory evidence of the denudation of the district, in which they are found, I shall here give a List of these *Hummocks of the* 1st *or Mill-stone Grit*, viz.

Alport Low, a small Hummock, near Shelf-stones, N of Doctor Gate, in Hope Woodlands.

Castle-top, NW of Lea-wood Houses, in Matlock Parish.

Coddington. See *Crich Chace.*

Combes Moss, a large Hummock, 2 *m.* N of Buxton, with some of the 1st Coal Shale on it (see p. 171).

Cophurst Edge, a long and forked Hummock, N of

Wincle Chapel, in Cheshire, extending to Homerton Nose S, and on to the SW flank of Shutlings-Low Hill.

Crich Chase, W of the Town, and extending to Watstanwell-bridge and Coddington, a large Hummock, with a patch of 1st Coal Shale and 2nd Grit on it, W of Crich Church.

Crook Hills, two small and remarkable Hummocks, 1 *m.* S of Darwent-chapel.

Crookstone Hill. See *Kinder Scout.*

Edale Head. See *Kinder Scout.*

Green-gutter, 1 *m.* SW of Flash, in Staffordshire, three Hummocks, two N and one S of the Brook, Ball Stones on the last.

Grindlow Rime, or Knowl, a small Hummock, ¼ *m.* N N W of Edale Chapel.

Hartle Moor, a large Hummock of coarse Grit, with most curious piles of Stones on it, N of Elton (perhaps not the 1st Grit, see p. 178, Note, and p. 228).

Hazleford. See *Sir William.*

Heacon Low, ¼ *m.* N of the Village, in Staffordshire (see page 224).

Higger Tor, 1½ *m.* E of Hathersage.

Homerton Nose. See *Cophurst Edge.*

Kinder Scout, a very large, high, and irregular Hummock, E of Hayfield, extending to Crookstone Hill and Edale Head, &c. probably having some of the 1st Coal Shale under its immense Peat Bogs. See page 171.

Lea-wood Knowl, ¼ *m.* SW of the Village (Mill-stones, see p. 221), a small Hummock.

Revedge, 1 *m.* NW of Warslow, in Staffordshire (Fire-stone, see p. 222).

Rock Hall, a small Hummock, 1 *m.* N E of Eyam.

Sheen Hill, ¼ *m.* N N W of Sheen, in Staffordshire.

Shelf Hummocks, a small one S and larger one N of the River, 1½ *m.* E of Glossop Town.

Shutlings Low, a small, high, and most conspicuous Hummock, 2¼ *m.* N N E of Wincle Chapel, in Cheshire.

Sir William, a large Hummock with an eastern dip, N of Eyam, extending to Hazleford and Leam.

Stanton Moor, S of Stanton in the Peak, a large Hummock (extending to Englestor, Birchover, Stanton-lees, and Pilhough), Hill-car Sough under it, Fire-stone. See p. 222.

Watstanwell-bridge. See *Crich Chase.*

Win Hills, three small Hummocks, one very conspicuous, 1¼ *m.* N and N E of Hope.

Great or Limestone Shale.

The greater part of the space coloured Purple in the Map facing page 97, and in the Section facing page 129, is occupied by Argillaceous Strata, principally a black Shale, which decomposes, or falls into Clay or strong Loam on the surface, and forming, where not too wet, a very productive Soil; but in some parts, the flakes of Shale are durable, remaining for ages in the soil, of the sizes of half-crowns and penny-pieces, whence it is, as I suppose, that such have obtained the name of *penny-shales*, which soils are generally found cold and unproductive; though draining and liming seems to perform wonders on all parts of this stratum, as I shall further shew in Sect. 1 and 3, of Chap. XII. From the decomposed Shale of this Stratum, Bricks and Tiles are made, in several places.

This great Shale, whose thickness has been proved by the shafts of the Lead-Mines in the 1st Limestone Rock underneath it, seems generally from 150 to 170 yards thick, sometimes consisting entirely of black or brown Shale, in very thin lamina; but, like the Red Marl which I have already described (page 146), this Stratum is subject to great and curious anomalies; the first and most general of which are, accidental beds of fine-grained Silicious Freestone, very full of Mica in minute plates, and stained with various concentric rings of different shapes and shades of yellow and red. This stone, which I call the *Shale-Freestone*, or Shale-Grit, from the circumstance of its always alternating with Shale, forms the most beautiful and perfect Freestone which is known in this district, as Chatsworth-House, Buxton-Crescent, Wirksworth Low-Peak Hall, and numerous other Buildings in the County will shew. A List of the principal Quarries of this stone will be found in the general List of Freestones in the next Section. I have mentioned above, the smallness of the particles of Silex as a character of the Shale Grit; but among the anomalies of the stratum to which it belongs, there is, at Stoney-Lee, 1¼ *m*. S E of Yolgrave, a cliff of the Shale-stone, not less bold and coarse in its grit than the 1st Grit Rock usually is, and which Rock I took it to be, until a third visit to the place, and examining the sinkings of Stoney-Lee Mine, satisfied me, that it is an accidental coarse part of the Shale Freestone; and I now suspect, that Hartle Moor may be covered by the same chance Rock, instead of the 1st Grit: in Kirk Ireton Town, there are also some coarse beds in the Shale Freestone, which at first I took to be the 1st Grit Rock.

In some places, there are accidental beds of the

Shale-stone of a canky hardness, and very fit for Road-making; the places where I have observed this kind of *Cank-stone* are,

Atlow, ¼ *m.* S E.
Cheddleton, S, Staffordshire.
Coldshaw, 2¼ *m.* W of Longnor, Staffordshire.
Edale Valley, N of Castleton.
Flash, SW, Staffordshire.
Grindon Common, 1¼ *m.* NW of Town, Staffordshire.
Gun-moor, N of Leek, Staffordshire.
Horton, 1½ *m.* W, Staffordshire.
Lower Bradnop, 2 *m.* WSW of Leek, Staffordshire.
Ousleden-foot Bridge, 2 *m.* N N W of Darwent-chapel.
Ramsor, ¼ *m.* NW, Staffordshire.
Rushton-James, Staffordshire.
Sutton, 3 *m.* S of Macclesfield, Cheshire,
&c.

But the most extraordinary anomaly attending this great Shale is; the great masses and accidental beds of dark blue or black Limestone which it produces, and which therefore I call the *Shale-Limestone**, and instead of assigning it a different colour, I have (as in the case of the Slate and Sienite in Red Marl, page 151) distinguished the tracts where it abounds, by a dotted Line. One of these tracts of Shale Limestone was, apparently, very large, extending in a NW direction from Atlow for near 14 *m.* to Mixon-Hay, in Staffordshire;

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* Said to be the Bituminous Marl Slate of Werner, by a Gentleman of his school, who had visited the Ashford Quarries; but another of these, represents it as an essential character of Bituminous Marl Slate, in the Fletz Formation, to rest on *old* red Sandstone, which certainly is not the case in any part of Derbyshire. See the article *Fletz*, in Dr. Rees's new Cyclopædia.

but

but about one half of this is now denudated and gone, together with a vast thickness of its under-measures, from off the lifted part of the 4th Limestone Rock, which is coloured Orange in the Map, and which now cuts this tract of Shale Limestone into two parts; that on the west side, around Butterton, abutting against the great Limestone Fault (which elevates the 4th Lime), from Water-Houses, near Caldon, to near Wetton, in Staffordshire, N N W; and it extends to Warslow, near to Upper Elkstone, to Mixon-Hay, near to Oncote, Butterton, and Waterfall, in Staffordshire. Between Wetton and Warslow, we find a much thicker part than usual, of this Shale Limestone, in thin beds, forming Ecton Hill, in which the famous and very deep Copper-Mine of that name is situate; and in the eastern tract around Kniveton, a very similarly constructed Hill exists, called Atlow-Win, or Maghill-Bowse, which not improbably, contains rich Minerals in its central parts. This eastern tract of Shale Limestone also abuts against the great Limestone Fault, from Thornwood, near Wootton, in Staffordshire, to near Newton-grange, N N E, and it extends to near Bradburne, to Hognaston, Atlow, Agnes-meadow, Fenny-Bentley, and near to Okeover, in Staffordshire.

About 5 *m.* almost S E of Atlow, in the line or axis of the great patch of Shale Limestone above described, the deep excavation for Windley Brook has laid bare a small tract of similar strata, on the south of Turnditch, and where considerable Lime-works are established.

In and to the SW of Ashford, and NW of Bakewell, another considerable tract of Shale Limestone is found, as the dotted lines and writing in the Map will explain, extending near to Sheldon. In these strata, the famous black Marble Quarries of Ashford are situate, where, as in numerous other places in the Shale Limestone tracts above mentioned, the most flat and perfect stratification imaginable, is to be seen; and yet it is not a little singular, that these same strata, often at a short distance from very flat parts of them, produce the most curiously contorted and undulating strata that can, perhaps, be seen in England: a slight specimen of these contortions may be seen in the quarry lately opened by the Buxton Road side, about 1 *m.* W of Bakewell Town; but the most surprising are those of Agnes-meadow and Hall-field Lime Quarries, 2¼ *m.* E N E of Ashburne, whose sudden undulations, are clearly, not the effects of Faults or mechanical violence, but are peculiar to the formation of these strata, since upon these curving and bent strata, others as remarkably true and horizontal are seen lying. North-east of Wood-eaves Cotton-Mills, about 2¼ *m.* N N E of Ashburne, another curiously contorted part of these strata is to be seen, and, in smaller degrees, in Kniveton Lime Quarries, N E of the Town, and at the SW side of Parwich Town. One other contortion of the Shale Limestone I have noticed, scarcely less remarkable than any of the above, viz. at the N E corner of Ecton Hill; and yet in the centre of the Hill, towards which these contortions appear to range, the strata are horizontal, as I am told by the Miners.

Rottenstone, which is used in polishing different substances, is a produce of this stratum, and seems owing to a decomposition or change which the Shale Limestone undergoes in some places, on or near to the surface. Dirtlow Moor and Cowden Pastures, 1¼ *m.* W of Bakewell, Wardlow-Mires, ½ *m.* E of Wardlow, and near Brownlow Toll-bar ¼ *m.* N of Butterton, in

Staffordshire, are places where it is now dug for sale: at the latter place, where it seems rather of inferior quality, it is sold at 50*s*. to 60*s*. per Ton. Formerly, Rottenstone was dug ½ *m*. E of Sheldon, near Ashford, and near Little Longsdon S.

Besides the four tracts of *Shale Limestone* which have been mentioned above, accidental beds of it have been discovered in some of the sinkings for Lead Mines (see Phil. Trans. No. 407), and in various parts of the Shale districts, viz.

Beresford-field House E, in Alstonfield, Staffordshire.
Biads-Barn Mine, 1 *m*. WSW of Wirksworth.
Castleton, in Mam-Tor Hill.
Cow-close Mine, N E of Warslow, Staffordshire.
Crowdycote Bridge, in Hartington.
Edale, near Over Booth.
Haybrook-gate Mine, N E of Warslow, Staffordshire.
Hurs Low, 1 *m*. NW of Grindon, in Staffordshire.
Little Longsdon, S.
Parwich Town, SW.
Pilsbury W, in Hartington.
Snitterton, in Darley.
Wardlow, ¼ *m*. E.

Some of the beds of this blue Shale Limestone, make a Lime which sets in Water, and is little inferior for water-works to the famous Barrow Lime (p. 114): perhaps these beds contain Manganese.

Ironstone is found in considerable beds in the Limestone Shale, and some large Balls* of it, as may be seen in the face of the many great *slips* which have happened in it, as in Mam-Tor, NW of Castleton, in Edale, at Calow Cupola E of Hathersage, at Lea (White Tor), near Cromford, &c. see p. 75; but this Ironstone is too far from Coals to have been turned to any account, since the Charcoal Furnaces were laid down.

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* The large Ferruginous Nodules in this Shale, which the late Mr. Wm. Martin observed on the NW side of the Old Hall at Buxton (Petrificata Derbiensia, plate 26), however they might be entitled to the term Septaria,

It has been already remarked (p. 175), that the Limestone Shale contains *vegetable impressions** in some places; these I have noted, SW of Blackwall in Kirk Ireton, ¾ *m.* S of Cheddleton, in Staffordshire, 1½ *m.* NW of Grindon, in Staffordshire, in Shaw-engine Mine in Eyam, in Westedge Mine in Ashover, &c.

In the following Places, either a basset of the thin accidental *Coal* beds, mentioned as above, are seen, and frequently talked of, as certain indications of *thicker seams of Coal below them* (according to the vulgar maxim on the subject), or expensive and fruitless trials by boring or sinking have been made; the result of their dear-bought experience, ought therefore to deter other

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Septaria, on account of their Septa or cracks filled with Spar, differ essentially from the *Ludus Helmonti* of the south-eastern districts of England: of which fossil, I saw but one specimen in Derbyshire, and that was in the Rev. Dr. Jackson's Collection at Risley, from the Gravel-Pit on Golden Hill, ¾ *m.* W of that Town.

Mr. Martin, in the passage above quoted, is not the only person who has improperly called the Ironstone Nodules of Derbyshire by the name of Ludi; for in the Collection of William Strutt, Esq. of Derby, I saw a specimen of the Dale-Abbey Ironstone balls, with white septa, so called, in a Catalogue made by a professed Mineralogist, who arranged and named the Specimens.

* What Dr. James Miller means by "Argillaceous Schistus, having impressions of organized bodies and figured Pyrites," resting on secondary Limestone in Derbyshire, which he mentions, when speaking of *Slate*, I am at a loss to guess. See 2nd Edit. of Williams's Mineral Kingdom, Vol. II. p. 178.

other Land-owners, within the wide range of *this* Shale Stratum, from similar attempts.

Trials for, and Appearances of Coals, in the Limestone Shale.

Allestry, ½ *m.* N of the Town.
Alsop, ¼ *m.* S E of the Town (2 inches thick).
Alton, near Kirk Ireton (¼ inch).
Ashburne-Green, N E of the Town.
Blackwall, in Kirk Ireton, SW (½ inch).
Bradley, ½ *m.* E.
Bull-Hill, in Hulland Ward, near Intake.
Ecton, ¼ *m.* N E of the Hill, in Staffordshire (½ inch), at 50 yards reached Limestone.
Grindon Common, 1⅓ NW of Town, Staffordshire.
Hill-cliff Lane, S E, near Turnditch.
Hopton-Hall S (1 inch).
Hulland Ward, trials in, recommended by Dr. Darwin, and by Mr. Pilkington, vol. I. p. 274.
Iderich-hay W, in Wirksworth (¼ inch).
Intake, in Hulland Ward.
Low-end Farm, SW of Sheen, in Staffordshire (¼ inch).
Lower-Nab E, 1 *m.* N E of Wincle Chapel, Staffordshire.
Nether Booth, or Lady Booth, in Castleton (2 or 3 inches).
Sandy-brook, N of Ashburne.
Swincoe, ⅓ *m.* W, near Okeover, in Staffordshire.
Tagneys, near Over-Booth, in Edale (1 inch).
Tintwistle S E, near Mottram, Cheshire (2 inches).
Turnditch, N E of the Town.

If Gentlemen, possessed of accurate accounts of any of the above trials, or of any others, would be pleased to communicate copies of them to the Author, it will add considerably to the usefulness of the further details which he has to offer, in the intended Mineral History of Derbyshire, &c. as to the places where Coals have, or may be, or may not be, discovered, and worked to advantage.

Several *Ochrey* and *Chalybeate Springs* issue from this great or Limestone Shale, of which mention will be made in Sect. 6, of this Chapter. *Sulphur*, in small quantities, is also found in its cavities; and Geodes of Limestone filled with liquid *Bitumen*, in Ashover, Castleton, Cromford, Eyam, Winster, &c. as will be further noticed in the List of Mines, and in the account of Bitumen in the next Section.

Before quitting this great Shale, which covers so large a portion of the district under consideration, and to which *Lime*, as an ameliator of its Soil, seems quite essential, I beg to mention, what occurred to me, on seeing such great and meritorious exertions making by the Farmers in carrying Lime over this very uneven Country, viz. that the great depth of the excavated Valleys in several places, and the rising of the Strata into some of the adjoining Hills, seem to render it more than probable, that Tunnels for Tram-waggons might be driven into the hills, in some instances, and reach the excellent Limestone Rock, which every where underlays this Shale, and that thus Limestone might, in some places, be procured in the vicinity of Coals, to the incalculable benefit of the Agriculture of the districts so circumstanced.

Several parts of the extensive Woodlands of Hope, which stand so much in need of improvement by liming, have, as I expect, Limestone above the level of the water in the adjoining Brooks, which might be both drained and worked by Tunnels, as hinted above; and if my other suggestion respecting this district (p. 171), viz. of Coals being procurable on Kinder Scout, should prove well founded, the improvement thereby to be effected, and by good Roads made through the vales of Edale, Ashop, and Derwent, would be great indeed. If Coals cannot be procured in these Woodlands, Peat certainly can, in the greatest quantities, for burning of Lime, if the stone were to be had; for which purpose the Hills N E of Darwent-chapel, and N of Rowlee, seem very promising.

The deep excavation made in the Shale by the Ethrow River, for some distance below and above Woodhead, between Derbyshire and Cheshire, and again by the Tame River near Mossley, between Cheshire and Lancashire, by the Revelin River, between Stannington and Hallam, in Sheffield, and by the Don River and its collateral branches, NW of Oughty-Bridge, in Yorkshire, leave little room to doubt, but that at each of these places, Limestone is accessible. In other parts of Cheshire, and in Staffordshire, where Lime is much wanted, the great height of particular Hills, composed of this Shale (and the Gritstone imbedded in it), compared with the depth of the near adjoining Valleys, seem to offer the Limestone which is under them, for the use of the Husbandman and the Builder; those which I have noted in this class are, a Hill SW of Jenkin Chapel, Dimpas Hill, $\frac{1}{4}$ *m.* NW of Forest Chapel, Shutlings Low, $1\frac{1}{2}$ *m.* S S E of the same place, and Mins Hill, $1\frac{1}{4}$ *m.* W of Wincle Chapel, in Cheshire: Gun-moor, $3\frac{1}{4}$ *m.* N of Leek, in Staffordshire, &c.

A detached patch or depressed Hummock of Limestone

stone Shale is found at Wardlow Mires E of Tideswell, and a sunk patch N of Windmill-houses near Great Hucklow.

From the scalcing of my large Map it results, that the parts of Derbyshire which are coloured Purple, and are occupied by the 1st Grit Rock and Limestone Shale, above described, extend to 160,500 Acres.

8. *Mineral Limestone and Toadstone Strata.*

The strata to be described under this denomination are six in number, viz. three Limestone Rocks, and three Basaltic Beds or strata, here called Toadstones, the whole being coloured Vermillion Red in the Map facing page 97, and in the Section in *Plate* V. facing page 129, which last, will explain their relative positions, and their average thicknesses *, nearly, the Toadstone strata being liable to vary in their thicknesses, and the Limestones also, perhaps, as the late Mr. John Williams shewed, of the Mountain Limestones of Scotland: see his "Mineral Kingdom," 2nd Edit. I. p. 55, 56, 124, 404. Here it will be observed, that I have changed the order of numbering the Rocks, from that used in the Coal Series above these, and now number downwards: the reasons have been, that in the Coal Series, the Grit-stone Rocks and Coal Shales were found the best marked and entire at the bottom of the Series (the upper part remaining yet in part undetermined, as explained page 162), whereas the Limestones and Toadstones were best marked and most easily traced, at the top of the Series, and it was not until many thousands of observations were made and recorded, that I could certainly determine, that the 4th Limestone Rock is the lowest which is accessible within the limits of my Map. The great Shale without Coals (page 227) stands therefore without a number, or numerical designation, and from it the strata are numbered both upwards and downwards.

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* The *Thicknesses* indicated by the scale at the bottom of this Section, are the averages of the thickness ascertained by actual sinking through the several strata in the Mines of Matlock, Ashover, Bonsal, Wensley, &c. and these Sections have been now three years in circulation among the Miners of this district, without any objection having been raised, to my knowledge, as to their want of proportionality or sufficient accuracy for the purpose in view, and indeed they agree nearly with Mr. Whitehurst's measurements, published 30 years before, previous to many of the sinkings being undertaken, on which my averages are founded; and yet, in Mr. Westgarth Forster's late " Treatise on a Section of Strata," page 45, he gives, on the authority of " Brown, &c. of Derby," a Table of Strata, which he says, " is, as nearly as can be ascertained, their medium observable in the County of Derby;" their thickness are set down in yards, feet, and inches, and include Grit-stone, Ironstone, Coal (20 inches thick), Grit-stone, Shale, Limestone, Toadstone (6 feet thick), and Limestone, all within the thickness or depth of less than 22½ yards!! This egregious misrepresentation of the facts of the Derbyshire Strata, seems referable to the same source, as the *fancy* Section, given as a frontispiece to Mr. Mawe's " Mineralogy of Derbyshire," viz. the *Tablets* of Strata made for sale in Derby, p. 14, *Note.*

The *first Limestone*, the uppermost of the series coloured Vermillion, bassets regularly from under the great Shale which was last described, all the way from Ranter Mine, NNE of Wirksworth Town, south, to near Quarters House, NNW of Great Hucklow, north, in an irregular line, passing near to Cromford, Matlock, Snitterton, Wensley, Winster, Elton, Middleton by Yolgrave, Yolgrave, Alport, Stanton in the Peak, Haddon Hall, Bakewell, Row-dale, Sheldon, Ashford, Little Longsdon, Great Longsdon, Hassop, Calver, Stoney-Middleton, Eyam, and Foolow. The remainder of the boundary of these strata, coloured Vermillion, against the Purple, from Quarters House near Great

Hucklow, northward, to Castleton Town, is principally limited by a vast Fault, which has been mentioned already (page 230), under the name of the Great Limestone Fault, and will be more fully described farther on: from Wirksworth Town south-westward to Hopton, a part of the same great Fault separates the 3rd Limestone Rock (part of the Vermillion) from the great Shale, &c. south of it.

The western boundary of the strata I am describing, coloured Vermillion in the Map (with the exception of about a mile on the S of Slaley and Bonsal, where the great Limestone Fault bounds them), is marked by the basset-edge of the 3rd or lowest Toadstone, and the appearance of the 4th Lime Rock from under it: such boundary, commencing at the great Limestone Fault in Hopton, and proceeding first NW, then W, and then N E, so as to include Harboro Rocks, then near to Griffe-House, and to the famous Hopton-wood Quarries, till it joins the Fault above mentioned, ⅐ *m.* NW of Middleton by Wirksworth. From the S side of Slaley, the boundary is again to be traced from this Fault, near to Ible W, and to Grange-mill, thence to Pike-hall, Dale-head Mine ¼ *m.* N E of Newhaven-house, near ½ *m.* SW of Benty-grange, W of Cronkstone, W of Hurdlow, E of Great Low Hill, E of Chelmerton Town, and W of the Low, by Flatt-house, Topley-head, and ¼ *m.* NW of Blackwell; it crosses the Wye River above Millers Dale, thence, by the side of Flag Dale, to Great-rocks, thence to near Small-dale, to Dale-head, ⅛ *m.* NW of Wheston, to Copt, Knowl, Portaway Mine, and thence across the Cave Dale to Cawler Hills, and along the same to the great Limestone Fault, above mentioned, in Castleton Town.

Within the limits coloured Vermillion, and described above, each of the three Limestone Rocks has its regular but crooked range, and basset-edge, from south to north, viz. the 1st Rock, from Wirksworth to Great Hucklow and to Quarters House, a little north of it, abutting at each end against the great Limestone Fault, as above mentioned; the 2nd Lime, from the great Limestone Fault in Middleton-wood on the north of Middleton by Wirksworth, to the same Fault again on the south side of the Windmill-houses, near Great Hucklow; and the 3rd Lime, from the same Fault, between Wirksworth and Hopton, south, to the same Fault, against which it abuts, from a point south of Windmill-houses (and passing Hazlebadge, Bradwell, Edingtree, and Pindale) to Castleton Town.

In like manner the three Toadstone strata, each abut against the same Fault, at the south and north ends of their respective ranges; the 1st Toadstone about $\frac{1}{3}$ *m.* NW of Middleton by Wirksworth, and again about $\frac{3}{4}$ *m.* NNE of Litton, near Tideswell; the 2nd Toadstone about $\frac{1}{2}$ *m.* W of Cromford, and again $\frac{1}{3}$ *m.* S of Windmill-houses; and the 3rd Toadstone from the same Fault, about $\frac{5}{8}$ *m.* W of Cromford, and meeting it again near the entrance of Cave Dale, in Castleton Town.

The many points which are ascertained, in each of these Limestone and Toadstone Strata, in the copious Lists of Hills and of Valleys given in Sect. 1, and in the List of Lead-Mines and the Lists of issolated patches of these strata which follow, must with the above, suffice for their local description here.

The phænomena of issolated patches of these strata, detached from the range or basset of them, arise from two distinct causes; they being, in one case, the remaining patches of strata, which have been stript off or denudated around them, and in the other, the superficial strata have been excavated or denudated locally, so as to shew patches of the under strata, surrounded by these upper strata: the first of these, are peculiar to the tracts proper to the lower strata (when not occasioned by a sudden lift of the strata), and are called *Hummocks;* the other, when not occasioned by a sudden sink of the strata, are found only in the tracts proper to the upper strata, to those detached. I have therefore separated these interesting phenomena of the Limestone and Toadstone strata, into two Lists, viz.

1st, *A List of Hummocks of the Mineral Limestones and Toadstones.*

Aldwark Village and SW of it, near Brassington, 3rd Lime and 3rd Toadstone.

Bole-end and Nabs Buts Hills, ½ *m.* N of Tunstead, 2nd Lime on a large Hummock of 2nd Toadstone.

Buxton and Fairfield, 3rd Lime and 3rd Toadstone.

Dove-hole, Barmoor and Sparrow-pit, 2 *m.* S E of Chapel-en-le-Frith, 3rd Lime and 3rd Toadstone.

Green-Fairfield and Water-Swallows, &c. E N E of Fairfield, 3rd Lime and 3rd Toadstone.

Harboro, ¼ *m.* SW of the high Rocks, in Brassington, 3rd Lime?

Knot Low, 1 *m.* S E of Wormhill, 2nd Toadstone.

Peak Forest Town, 3rd Lime and 3rd Toadstone, depressed.

Staden Hill, 1 *m.* S E of Buxton, 3rd Toadstone

Tester Bank, 1½ *m.* S SW of Tideswell, 2nd Lime and 2nd Toadstone.

Tunstead NW, 2nd Lime, on a large Hummock of 2nd Toadstone.

Via-Gellia Road, near the crossing of the Brassington and Wirksworth Road, three small Hummocks of 3rd Lime?

Wheston S S E, near Tideswell, 2nd Lime and 2nd Toadstone.

Wormhill, Hargate-wall, Bole-end Hill and Tunstead, a large Hummock of 2nd Toadstone, with three Hummocks of 2nd Lime on it.

2nd, *A List of detatched Patches of the above Strata, occasioned by Excavation.*

Ashover and Overton, a wide ring of 1st Lime, with 1st Toadstone within it.

Bakewell, N N W of the Town, 1st Toadstone, the great Bakewell Fault N of it.

Barmoor-clough (or Loads-knowl), 1¼ *m.* S E of Chapel-en-le-Frith, 1st Lime, bassets, the great Limestone Fault S E.

Blackwell Village, near Chelmerton, 3rd Toadstone.

Blobber-Mine Hill, ½ *m.* S S W of Wirksworth, 1st Lime.

Bonsal Town, N end, 3rd Toadstone.

Bradwell Town, S E, near Great Hucklow, 1st Lime, bassets, the great Limestone Fault W.

Castleton Town S W, 1st Lime, bassets, the great Limestone Fault S.

Combs Dale, S W of Stoney Middleton, 1st Toadstone, at High-field Sough.

Crich Town and Cliff-Hill, 1st Lime, a Fault W of the Town*.

Great-rocks Dale, W of Tunstead, three patches of 3rd Toadstone, sunk?

Little-banks at Lane-head, ½ *m.* W of Castleton, 3rd Toadstone, sunk? the great Limestone Fault N E.

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* See *Crich*, in Dr. Rees's new Cyclopædia.

Matlock Tor-foot, 2nd Toadstone. See the Section in *Plate* V. facing page 129.

Millers Dale, S S W of Tideswell, from the lower Mill to Ravens Tor, 3rd Toadstone.

Monks Dale, ¼ *m.* E of Hargate-wall, 3rd Toadstone.

Odin-Mine Hill, 1 *m.* N W of Castleton, 1st Lime, bassets, the angle of the great Limestone Fault S W and S E, at foot of Mam-Tor Hill.

Over Haddon S, a ring of 1st Toadstone, and 2nd Lime within it, the great Bakewell Fault at W end.

Pindale, ½ *m.* E S E of Castleton, 1st Lime, bassets, the great Limestone Fault S.

Tideswell Dale, 1 *m.* S of the Town, 3rd Toadstone, a Fault N of it.

Wensley, ¼ *m.* N N E of the Village, near Darley Church, 1st Lime.

Wirksworth Windmill-hill, ¼ *m.* WSW of the Town, 4th Lime, risen.

Yolgrave, ½ *m.* S W of the Town, 1st Toadstone, near Nick-sough Mine, the great Bakewell Fault W of it.

The subject of these Excavations will be further illustrated, when I come to speak of the beds of the different Rivers, in Sect. 6, of this Chapter.

Veins of Lead, Zink, Manganese, Copper, Iron, Fluor, Barytes, &c.

The Strata which I am now describing, and sometimes those immediately above and below them (viz. Shale and 4th Lime), contain great numbers of Mineral Veins, which are of three distinct kinds; the most common, is called a *Rake Vein*, which is in fact, a straight and vertical crack or fissure in the Limestone strata, filled with Spar and Ore, &c.; a *Pipe Vein*, which is a cavity, often horizontal nearly, between the beds of Limestone, filled in like manner, having a narrow rake vein, or rake-leading from it, to the surface of the stratum (See 21 of these, mentioned in the following List): and a *Flat-work*, which is a horizontal cavity in the strata, filled with Spar and Ore, without the rake-leading peculiar to Pipe Veins. This last kind of veins are rare in Derbyshire, wherein I heard only of three, viz. Cross Flat, Maury, and Robinstye Mines (see the List of Mines which follow). The late Mr. John Williams could therefore have been little acquainted with the Mines of this County, when he mentions much of the Ore here, being found in Streek or *Flat* veins. See Min. Kingd. 2nd edit. I. 345, 282.

The *Rake Veins*, which are far the most numerous, generally preserve a pretty straight course on the surface, and they often run parallel with each other, having others crossing them almost at right angles. It is now supposed, by many practical Miners, and so they construe their Titles to the Veins, that every principal vein extends through the whole series of Limestone Rocks, as from the top of the 1st to the bottom of the 4th Rock (see the Section in *Plate* V.), but not without interruption, since the three Toadstone Rocks are very rarely broken through, I believe*, so as to connect the veins above and below them, except where *Faults**, have since happened to follow the ranges of the veins. In small veins, it is common to find the Toadstone quite entire between the veins, forming a sole-stone to that above, and a lid-stone to that below, of the full width of the vein in each case, but from the larger veins, a crack or rent generally extends some distance into the Toadstone, both above and below, growing narrower, and often branching into different small cracks, scrins or strings, as it proceeds; and in the same manner the veins often strike up into the Shale, which covers the 1st Limestone: those are said by the Miners, to be very *powerful veins*, which break through the Toadstone. Besides the Toadstones (which in some instances assume the consistence of Clay), each Limestone Rock has in it, *wayboards*, thin strata or partings of clayey matters, some of the thickest of which, divide even the larger veins, as completely as the Toadstone strata do, as I am informed by Mr. Joshua Gregory, an experienced Miner; and like the Toadstones, they often hold up, and completely divide the springs of Water, in the different parts of the Limestone Rocks.

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* A small Pamphlet, which I do not remember to have seen or heard of, until that I lately read an extract from it, in the Appendix to the Translation of Werner's New Theory of Veins, page 258, seems to have led the Translator, Dr. Charles Anderson of Leith, into a belief, that what M. Werner had, from other sources, understood (p. 131) to happen *sometimes* (perhaps where Faults and Veins have coincided), was a frequent occurrence, nay, that Veins in Derbyshire "*generally* descend through the Toadstone;" a still later writer of Edinburgh, Dr. James Millar, has also adopted the same, in his Appendix (p. 230 and 447) to the 2nd Volume of Williams's Mineral Kingdom: I see no reason however to alter what I had written above, previous to having read any of the Books here quoted.

Surprising as these phenomena attending Mineral Veins are, they will I think receive an explanation, by supposing, that the Limestone strata were subject to a great contraction or shrinking, since their formation and consolidation, which did not extend to the Toadstones, to the principal Way-boards, or to the Shale above, and yet, that the mechanic force with which the sides or skirts of the veins drew apart, rent or tore the Toadstone and the Shale for certain distances, where the veins abut against them. And since the Toadstones, and the Way-boards, effect in general, a complete separation, even to the water, in the different parts of the vein, besides, the Shale and a vast thickness of upper-measures having covered the whole*, it seems difficult to conceive, any other origin to the spar and metallic Ores which line these large cracks or veins, than infiltration of some sort, from the adjoining Rock: a supposition, which receives confirmation from the fact, so well known to Miners, of certain thick beds of Limestone in some of the Rocks, producing more Ore, in the vein *between them*, than is found between other beds in the same Rock; whence such are called *bearing-measures*, or feeding ground, by the Miners. The two sides of a large Rider, or near and parallel veins, are seldom, if ever, rich together.

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* I am more surprised every day, at the little notice which writers on Mines, seem to take of *Faults*; it cannot be said that M. Werner's "New Theory" of Veins, notices these grand Geological Phenomena, except it be, to confound their appearances and effects, with Mineral Veins, as should seem, from pages 65, 81, 82, 106, 160, &c. of the Translation, and wherein, the recent Notes of the Translator, correct or supply nothing on this head. A still later writer, Mr. Westgarth Foster, in his "Treatise on a Section of the Strata," Newcastle, 1809, might, from the knowledge which he appears to have of Faults in the Coal-series, have avoided some of the confoundings, of Veins and Faults, which appear at pages 64, 122, 142, &c. of his work.

Next to the walls or *Skirts* of the veins, which are of unequal distance apart in the same vein, in many instances, a lining of *Vein-stuff*, as Crystals of Carbonate of Lime (Calcareous Spar), of Fluate of Lime (Fluor Spar), or of Sulphate of Barytes (Cawk), is applied; which Vein-stuff, in some narrow places or humps in the Vein-skirts, have met, and there the vein is said to be *twitched* or nipt-up, and little or no Ore is there found. Upon the linings of Spar, or first formations of Vein-stuff, a certain thickness of Lead-Ore is deposited, generally the Sulphuret of Lead, *Galena* or blue Ore, in cubes, which are called, either *steel-grained*, or *Leaf-Ore*, from having a fracture somewhat like a thorn leaf; and it often happens, that the original width of the vein and the thickness of deposited Spar, was such, that these crystals of Ore meet and are close wedged together, forming what is called one *Rib of Ore*, with Spar on each side of it in the vein. In wider veins, it has happened, sometimes, that a second deposit of Spar took place upon the Lead-Ore, and continued increasing until the sides met and were close wedged, and such parts have two Ribs of Ore, which sometimes differ in their qualities, as at Gregory and Lucky-ploughman Mines, &c.; in some rarer instances, the second deposits of Spar have ceased before the vein was quite filled, and Lead-Ore completed the filling, and in such parts three Ribs of Ore are seen, as in Yoke-cliff Mine, &c.

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* As Mr. Whitehurst rightly conjectured, in the 1st edit. of his "Inquiry concerning the Earth, pages 156 and 165; but wherein he erred totally, page 155, in asserting, that the bottoms of the Valleys contain the ruins of such strata.

In many instances, instead of regular Ribs of Ore being found, as above, the deposits of Ore and of Spars of different kinds, seem to have gone on together, and the Ore is found dispersed in different sized cubes, more or less perfect, throughout great part of the Vein-stuff: and indeed it seldom happens, that the Spar is entirely free from small cubes of Lead-Ore, even where ribs of Ore are met with. In the same manner as the narrow parts of the vein were prematurely full and nipt-up, the swells or wider parts of the vein, which always happen gradually, and not by sudden leaps or off-sets, remained unfilled, when the other parts had become so, and such are now sometimes found open, and are called *Tick-holes*, Jouph-holes, Druses, Nests, Lochs, &c.;

from

from the linings of which open spaces, all the perfectly crystalized specimens of Spars and Ores are obtained; though without doubt, the skirts and ribs of Ore, most of them, were equally perfect in their form, before they were covered and close wedged with the crystals from the other side of the vein. But in the greater number of cases, particularly where the Tick-holes or empty spaces in the vein were large, a confused and coarse kind of crystalization, often of a stoney texture in part, has completely filled up these cavities, sometimes without the admixture of any Ore or perfect Spar; these stoney masses are called *Riders*, I suppose, from the circumstance of their always resting upon Spar (and Ore for the most part), and never touching the vein-skirts or Rock, in which the vein is formed.

The form of Riders, is I believe, invariable, that of a *lense* erect, more or less regular, ending in a sharp edge at top, bottom and all sides, just such a shape as Tick-holes have. I speak of Riders completely *in* the veins, and not of such as happen to be partly denudated along with the surface of the ground, where the veins come to day, or where they may abut against Toadstone, Shale, or a Way-board: and it rarely happens in Derbyshire, that perfect and good Limestone occurs in the Riders, such being, what they called huzzardy or ochrey, cherty, and mixed with Spar, while none of the same regular Beds which are observable in the adjacent Rock, or any organic remains, are found in them, as far at least as my observations and enquiries among practical Men have gone, and I have bestowed much pains on the subject, from having early discovered the improbability, of Veins and Faults having had a common origin, and of Riders being fragments of the adjacent Rock, which are the opinions entertained by most of the writers, whose works have fallen under my notice.

It seldom happens, that rake-veins are exactly vertical; when they incline sensibly, it is called *hading*, which some veins do considerably; generally there is but one hade or direction in the vein, but in some instances this changes as we descend, and a vein first hades S, then N, then S again, &c. even in the same Rock. In the List which follows, 18 Mines are noted, where the Hade is either considerable, or remarkable.

The Vein underneath a Toadstone Bed, is seldom nearly of the same width, or of the same nature exactly, as that above it, nor are they exactly under each other, although generally they follow about the same range. Veins with such deviations, are said to be *squinted*, or leapt aside (7 instances of which are noted in the List which follows), which is in some instances so considerable, that Lawsuits have arisen, to determine, whether they are the same Vein or not*.

Faults, as before observed, sometimes range along, and have broken the Vein-stuff of Rake and Pipe Veins, and introduced rounded quartz Pebbles or *Gravel*, alluvial Clay, and other extraneous mineral matters, below the tick-holes which connect with the surface, and such are often called soft-veins, or said to be filled with *softs*: I have adduced 13 instances, of Gravel, &c. in the following List; and thus perhaps it is, that organized substances, or *Extraneous Fossils*, have in some rare instances found their way into Veins, as has been asserted at Ball-eye, Coast-Rake, Mill-close, Odin, Seven-Rakes, and Virgin Mines.

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* A more improbable opinion could hardly have been advanced, than that of M. Werner, if I rightly understand the obscure Note at bottom of page 129, and the text in page 131, of the Translation of his "New Theory of Veins," viz. that the Toadstone occasioned the squinting of the Veins, or their being "thrown to a side," by its very unequal *thickness* and hardness.

Faults sometimes range across, and divide or terminate Veins, of which some cases will be found among the 20 instances of Faults in Mines, in my List.

Sometimes the Vein-stuff is found perfectly divided vertically, throughout, and the surfaces polished; and these are called *Slickensides* * or Cracking-whole, which usually are ribbed or slightly fluted, horizontally: the appearances are very similar to those of Faults, but extraneous matters do not usually accompany them, the sides being mostly in very close contact; and often, after one side is removed, so as to give room †, especially if the surface be pecked or broken, large Slapits, Spels, or fragments fly off, sometimes with loud explosions, and continue so to do for some days or longer, until the gate or passage in such Vein is greatly enlarged thereby: this is the case in Gang Mine, in Cromford, where the hard 1st Toadstone also, in the gates and shafts, thus spels off, until they want timbering, often, to support the roof and sides. I could not learn, that the Slickensides in the Mines about Eyam explode now, on mere scratching, as they were said to do in the late Mr. Whitehurst's time. I have noted 9 instances of Mines with Slickensides in them.

Although it has confidently been asserted by some, that Lead-Ore does not occur in Shale, or in Toadstone, particularly the latter; yet I have mentioned 11 places where Shale, and 19 places where Toadstone carried Ore, in strings and short branches, and doubtless the instances are far more numerous.

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* See Sowerby's "British Mineralogy," plate 392, page 167.

† For Slickensides do not form "the sides of *cavities*," as Dr. Millar seems to represent, in Williams's Min. King. 2nd Edit. II. 449.

The most productive Mines have been in the 1st Lime Rock, and those least so, perhaps, in the 4th Rock, which does not appear to carry Ore below certain Measures in it, though the Veins and Spar still hold their widths, without any obvious diminution in descending, in this or either of the other three Rocks. Of the Mines contained in the following List, 4 are sunk in Shale and Shale Limestone, 4 in Shale Limestone, 54 in Shale and 1st Limestone, 2 in Shale Limestone and 1st Lime, 102 in the 1st Limestone, 10 in 1st and 2nd Limestone, 16 in the 2nd Limestone, 4 in the 2nd and 3rd Limestone, 33 in the 3rd Limestone, 13 in 3rd and 4th Limestone, 3 in the 3rd Toadstone, and 32 in the 4th Limestone Rock.

The custom which prevailed originally, of granting many Titles or possessions of Mines on each Vein, when of considerable length, each of which had its own Name, as well as to very many small Veins, which did not afterwards answer to work, except very near to the surface, renders it impossible to give a general List of the Mines, as I have attempted with respect to the Collieries, p. 188, and the following have been selected, from among the most productive and important Mines, or on account of their illustrating some points of importance in the process of Mining, or in a Geological view.

A List of LEAD-MINES[*] *which are work in Derbyshire, and in such Parts of its adjoining Counties, as fall within the Map of Strata and Soils facing page* 97.

Abbots-hole, or White-vein, at Alport, in Yolgrave, in 1st Limestone Rock, Lead Ore.

Adventure, in Cromford, in 1st Lime, Lead, recent Asbestus ?

Alderley-edge (or Autherly), NW of Macclesfield, Cheshire, in alluvial Grit Rock, Lead, White Ore, Copper, Cobalt, Manganese[†].

Alport, at Spout, near Ashley-hay, in Wirksworth, in 1st Grit Rock, Lead.

Amos-cross, in Stanton in the Peak, Shale and 1st Lime, Lead.

Ash-cross, in Cromford, Shale and 1st Lime, Lead, Ore in Shale, Ochre, fibrous Spar, large cubes of fluor Spar and curious Crystals, Corrosive Water.

Bacchus-pipe, near the Cliff, in Crich, in 1st Lime, Lead, hades W very fast.

Bacon-close, near Yolgrave, in 1st Lime, much Lead: an Hydraulic-pressure Engine.

Bage, in Wirksworth, in Shale and 1st Lime, Lead, Cawk (or Barytes), a hot spring in 1st Lime.

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[*] This List, in a different form, viz. arranged according to the *Places* in or near which the Mines are situate, will be found in Mr. Tilloch's Philosophical and Geological Magazine, vol. 37, page 107, though without the particulars of each Mine, here given.

[†] See a description of this singular Mine by Mr. Henry Holland, in his Report on Cheshire, p. 15, and another by Mr. Robert Bakewell, in the Monthly Magazine, vol. 31, p. 7.

Bald-mare, in Brassington, in 3rd Toadstone, Lead, White Ore, Ore in Toadstone, Ochre, China Clay, Gravel.

Ball-eye, in Bonsal, in Lime, much Lead, some Silver, purple Fluor, Bones?

Barkers-field, in Crich, in 1st Lime, Lead, crosses several Veins.

Barley-close Pipe, in Wensley, near Darley, in 1st Lime, Lead.

Barlow-flat, NW of Wirksworth, in 3rd Lime, Lead, Calamine.

Barrow Vein, in Cromford, in 1st Lime, Lead, Way-boards, hades very curiously, crosses Gang Vein.

Biads-Barn, in Wirksworth, in Shale, Shale Limestone, and 1st Lime, Lead.

Bincliff, S of Wetton, in Staffordshire, in 4th Lime, Lead.

Birchwood-park, in Roston, in Limestone (in the Red), Lead, Fluor, green Spar.

Birds-head, in Bakewell, in 1st Lime, Lead, the great Bakewell Fault crosses its N end.

Black-hillock, on Tideswell Moor, 3rd Lime and 3rd Toadstone, a trial.

Black-hole, in Eyam, in Shale and 1st Lime, Lead.

Black-shale-pits, in Yolgrave, 1st Lime and 1st Toadstone, Lead.

Black-stone Shaft, at Overton, in Ashover, in 1st Lime and Toadstone, and 2nd Lime, a trial.

Blakelow, near Breach-gate, in Bonsal, in 2nd Lime? Lead, Black Jack.

Blakelow-Engine. See *Longstone-edge-venture*.

Blithe, at Alport, in Yolgrave, in 1st Lime, much Lead, Black Jack.

Blobber, in Wirksworth, in 1st Lime detached, Lead.

Blythe, in Stanton in the Peak, in 1st Lime, Lead, Pyrites (or Brazil).

Boggard, or Don-Philip, in Wirksworth, in 3rd and 4th Lime, Lead in large Cubes, Cawk, the great Limestone Fault crosses its E end.

Bondog-hole (or Dog-holes), in Middleton by Wirksworth, in 3rd and 4th Lime, Lead, Ore in Toadstone, Cawk, very wide in 3rd Lime, a Wayboard in 4th Lime, a Cavern, Stalactites, hades, squinted, a Fault through it? deep, large Hillocks of refuse Vein-stuff.

Bond's Vein, NW of Wirksworth, in 3rd Lime, Gravel.

Bonsal-Leys Mines, in Bonsal, in 3rd Lime, Lead, Calamine, Cawk.

Booth-Lee, at Brushfield, in Bakewell, in 2nd Lime, Lead, Black-Wad, yellow Ochre.

Boston Vein, in Peak Forest, in 3rd Lime, Lead.

Botany-Bay, at High Needham, in Hartington, in 4th Lime, Lead.

Bright-side, in Rowland, near Hassop, in 1st Lime, Lead, hades S very fast.

Brimstone-Dyke, at Overton, in Ashover, in 1st Lime, much Lead, a loose Shale Gulph.

Broad-low, at Bretton, in Eyam, in Shale and 1st Lime, Lead.

Brook-head, in Eyam, in Shale and 1st Lime, Lead, Slickensides, Petroleum in Lime Geodes in Shale.

Broomhead-Mill, near Bolterstone Chapel, Yorkshire, in Grit (perhaps alluvial), Lead, Black Jack.

Broomhead's-venture, at Riley, in Eyam, in Shale and 1st Lime, Lead.

Bull-Rake, near Tideslow Top, in Tideswell, in 3rd Lime, Lead.

Burrows, in Middleton by Wirksworth, in 3rd and 4th Lime, much Lead, Pyrites, squinted.

Cackle Mackle, in Great Longsdon, in 1st Lime, hard, Black Wad.

Calow, in Winster, in 1st and 2nd Lime, Lead.

Calve-stone, on Tideswell Moor, in 3rd Lime, Lead, Ore in chance beds of Toadstone.

Carrion-hole, in Cromford, in 1st Lime, Lead, Black Jack, hades S.

Carsington Hill, ¼ *m*. N W of Carsington, in 4th Lime, Lead, Calamine, Manganese.

Caulk, in Crich, in 1st Lime, Lead.

Cawk Vein, in Cromford, in 1st Lime, Lead, Calamine, Cawk, crooked, crosses Gang Vein 6 times!

Chapel-dale, at Flagg, near Monyash, in 3rd Lime, Lead, White Ore, clay Wayboards.

Chap-maiden, on Tideswell Moor, in 3rd Lime, Lead, chance Toadstone beds.

Church Rake, in Crich, in 1st Lime, Lead.

Clay-pit-dale, near Hartington, in 4th Lime, Lead, China Clay, Gravel.

Clear-the-way, on Tideswell Moor, in 3rd Lime and 3rd Toadstone, Lead.

Cliff-side, N of Winnets Dale, in Castleton, in 4th Lime, Lead, coloured Fluors.

Cliff-stile, in Eyam, in 1st Lime, Lead.

Coal-hole Rake and Pipe, on Masson, in Matlock, in 2nd Lime, Lead, roof fallen.

Coal-pit-hole, at Perry-foot, near Castleton, in 4th Lime, Lead.

Coast-Rake, in Winster and Elton, in Shale and 1st Lime, Lead, a Fault through it, crosses many Veins, Wood, Gravel.

Cockwell, at Mill-town, in Ashover, in Shale and 1st Lime, Lead.

Corder-Low, near Ludwell, in Hartington, in 4th Lime, hades 1 in 3.

Cornel-Rake, at Matlock Bath, in 2nd Lime, Lead, Calamine.

Cow-Close Pipe, in Elton, in 1st Lime, Lead, a Toadstone floor, 60 yards wide!

Cow-Close, E of Over-Haddon, in 1st Lime, Lead.

Cow-close, or Asholme, in Warslow, Staffordshire, in Shale and Shale Limestone, Lead, Ore in Shale.

Cowslop, E of Wardlow Village, near Tideswell, in 1st Lime, Lead.

Cracking-whole Rake, in Eyam, in 1st Lime, Lead, Slickensides.

Crash-purse, in Yolgrave, in 1st Lime, Lead, an Hydraulic-pressure Engine.

Crich-Cliff, NW of Crich, in 1st Lime, Lead, yellow transparent Fluor, Clay Wayboards.

Crichman Pipe, on Masson Hill, in Matlock, in 2nd Lime, Lead.

Crooked Rake, in Crich, in 1st Lime, Lead.

Cross Flat-work, in Middleton by Yolgrave, in 1st Lime, Lead.

Crosslow Rake, in Foolow, near Eyam, in 1st Lime, Lead, a large Cavern.

Cross-o'-th' dale-head, in Great Longsdon, in 1st and 2nd Lime, Lead.

Cross-Rake, on Matlock High Tor, in 1st and 2nd Lime, Lead, Calamine.

Cumberland (or Rutland Mine), at Matlock Bath, in 2nd Lime, Lead, Calamine, some Copper, and Carbonate of Iron, capillary Gypsum, clay Way-boards, a Cavern, roof fallen.

Cursed-moor, near Aldwark, N of Brassington, in 4th Lime, Lead, White Ore.

Daily-bread, in Chelmerton, in 3rd Lime, Lead.

Dale, in Over Haddon, in 1st Lime and Toadstone, Lead, Ore in Toadstone.

Dale, in Warslow, Staffordshire, in Shale and Shale Limestone, much Lead, Ore in Shale, some Copper.

Dale-top, in Wirksworth, in 3rd Lime, Lead, Gravel.

Deep Rake, in Foolow, near Eyam, in 1st Lime, Lead.

Deep Rake, in Hassop and Great Longsdon, in 1st Lime, Lead, White Ore.

Dimple, at Matlock Bank, in Matlock, in Shale and 1st Lime, Lead, Pyrites, Fluor, curious Crystals, the only Mine Steam-Engine going in 1809, in Derbyshire.

Dimsdale, in Calke, adjoining Leicestershire, in yellow Limestone ? Lead, Black Jack.

Dirtlow, S E of Castleton, in 1st Lime and Toadstone, Lead, Ore in Toadstone.

Dog-hole. See *Bondog-hole*.

Dog Rake, in Calver, near Hassop, in Shale and 1st Lime, Lead, White Ore.

Dover-Gang. See *Gang*.

Dovestone-Leys, in Cromford, in 1st Lime, Lead, Calamine.

Drake. See *Lime-kilns*.

Dream. See *Stafford's Dream*.

Dunshole, in Stanton in the Peak, in 1st Lime, Lead, Pyrites.

Earl of Mar, on Middleton Intake, near Wirksworth, in 3rd and 4th Lime, Lead, hades, intersects a Fault, clay Wayboards.

Ecton, Pipe, near Warslow, Staffordshire, in Shale Limestone, and perhaps 1st Lime, Copper and Lead, Slickensides, Shaft 440 yards deep!! a Railway Tunnel into the Hill, and water Sough through it.

Edge-side Rake, in Foolow, in 1st Lime, Lead.

Eyam-edge, near Great Hucklow, in Eyam, in Shale and 1st Lime, Lead.

Fall-hill, at Mill-town, in Ashover, in 1st Lime, Lead, large cubic Fluor, Quartz Crystals.

Field-side, S of Tideswell, in 3rd Lime, Lead, a Fault through it.

Field Rake, in Sheldon, in 1st Lime, Lead, very wide in Spar.

Fiery-dragon, in Bonsal, in 3rd Lime, Lead, Ore in Chert, white Chert.

Fore-side Rake, or Faucet, in Castleton, in 4th Lime, Lead, Devil's-hall Cavern.

Fox-hole, S of Wirksworth, in 1st Lime, Lead, Calamine.

Gang, or Dover-Gang, Godber, Goodluck, and Great-Pits, in Cromford and Middleton by Wirksworth, in Shale and 1st and 2nd Lime, much Lead, Ore in Shale and in Toadstone, Pyrites, Black Jack, large Cubes of Fluor, wide, hard Spar, Petroleum in Lime Geodes in Shale, hades both S and N, squinted, Slickensides, deep, large Hillocks, a hot Spring in 2nd Lime, Water-Wheels in the Sough under-ground.

Gentlewoman's Pipe, near Matlock Bridge, in 1st Lime, Lead.

Glade Rake, SW of Ashford, in 1st Lime, Lead.

Godber, or Goodbehere. See *Gang*.

Golconda Pipe, in Griffe, near Hopton and Brassington, in 4th Lime, Lead, immense Caverns.

Goodluck, in Cromford. See *Gang*.

Goodluck (Burdet's), N E of Wirksworth, in 1st Lime, Lead, Horse-Gin Pumps.

Gorsey-Dale, near Bright-gate, in Bonsal, in 3rd Lime, Lead, 2 chance Toadstone beds.

Granby Shaft, at Matlock Bank, in Matlock, in Shale and 1st Lime, a trial.

Great-Pits. See *Gang*.

Green-linnet, W of Brassington, in 4th Lime, Lead, Green Ore, China Clay.

Greensward (or Green-swarth) Rake, in Ashford, 1 *m*. N E of Monyash, in 1st Lime, Lead, clay Way-boards.

Greenway-field, in Cromford, in 1st Lime, Lead, Calamine.

Gregory, at Overton, in Ashover, in 1st Grit, Shale, and 1st Lime, much Lead, Antimoniated Lead Ore? Ore in Shale, two ribs of Ore of different kinds, transparent Fluor with silvery Pyrites, large Crystals of Calc. Spar, Slickensides, Bitumen in 1st Lime; a Shaft 300 yards deep!, a large Hillock.

Grey-mare, in Wirksworth, in Shale and 1st Lime, Lead.

Hading-vein, in Cromford, in 1st Lime, Lead, hades S 1¼ in 1.

Hagues Groove, in Callenge-low, near Monyash, in Yolgrave, in 1st Lime, Lead, a crooked Rake.

Hang-worm, near Bright-gate, in Bonsal, in 3rd and 4th Lime, Lead.

Hard Rake, in Crich, in 1st Lime, Lead.

Hard Rake, in Sheldon, in 1st Lime, Lead, Calamine.

Hare-dale. See *Mockshaw*.

Have-at-all, in Great Hucklow, in Shale and 1st Lime, Lead, a Fault through it.

Haybrook-gate, in Warslow, Staffordshire, Shale and Shale Limestone, Lead, Ore in Shale.

Hay-cliff (or High-cliff), at Bretton, in Eyam, in Shale and 1st Lime, much Lead, Slickensides.

Hazlehurst, in Crich, in 1st Lime, Lead.

Hedge Rake, NW of Tideswell, in Lime, Lead.

Hell Rake, in Bradwell, in 3rd Lime, Lead.

High-field, in Stoney Middleton, in 1st Lime and Toadstone, Lead.

High-low Pipe, in Monyash, in 1st Lime and Toadstone, Lead.

High Rake, in Tideswell, in 3rd Lime and Toadstone, Lead, Ore in Toadstone.

High-tor Rake, near Starkholmes, in Matlock, in Shale and 1st Lime, Lead, yellow Ochre.

Hill-house, at Mixon, in Upper Elkstone, in Staffordshire, in Shale Limestone, Copper.

Hills Rake, at Windmill-houses, near Great Hucklow, in 1st and 3rd Lime, Lead, yellow Ochre, the great Limestone Fault crosses it (see pages 239 and 240).

Hill-top, S of Middleton by Wirksworth, in 3rd and 4th Lime, Lead, Gravel, squinted N, deep, large Hillocks.

Holley-hole, in Wirksworth, in Shale and 1st Lime, Lead.

Horse-steads, in Taddington, in 2nd and 3rd Limes and Toadstones, Lead.

Hubberdale Pipe, in Monyash and Sheldon, in 1st Lime, much Lead, White Ore, Barytes.

Hucklow-edge, in Great Hucklow, in Shale and 1st

Lime, much Lead, a Fault through part of it, large Hillocks.

Jackson's, in Middleton by Wirksworth, in Shale and 1st Lime, Lead, crossed by a Fault at W end.

Jowl-groove, in Peak Forest, in 4th Lime, Lead.

Knowle's, on Masson Hill, in Matlock, in 2nd Lime, Lead, Fluor Spar, large Caverns.

Lady-gate, near Matlock Bridge, in Alluvium and 1st Lime, Lead.

Ladywash, in Eyam, in Shale, 1st Lime, and Toadstone, much Lead, Ore in Shale and in Toadstone, Slickensides, a Shaft 306 yards deep!

Lane-head. See *Speedwell.*

Lea-wood, at Snitterton, in Darley, in 1st Lime, Lead.

Leas Vein, NW of Wirksworth, in 3rd Lime, Lead, Gravel.

Lees, in Taddington, in 2nd and 3rd Lime, Lead, squinted.

Lime-kilns, and Drake, in Winster, in 1st Lime, Lead, Petroleum, Gravel, Caverns.

Littlebrook-head, in Stoke, near Eyam, in Shale and 1st Lime, Lead.

Little Pasture, in Eyam, in Shale and 1st Lime, Lead, Ore in Shale, and Lime Geodes containing Petroleum, hades, Fire-damp.

Long-dale-head, N E of Newhaven-House, in Hartington, in 3rd Toadstone and 4th Lime, Lead, Black-Wad, Ochre.

Long Rake, in Yolgrave and Middleton, in 1st and 2nd Lime, Lead, Calamine.

Longstone-edge-venture, in Great Longsdon, in 1st and 2nd Lime, much Lead, fibrous Spar, hades N: this Rake parts and meets again.

Lucky-ploughman, in Brushfield, in 2nd Lime, Lead, lately opened, two Ribs of Ore of different kinds.

Magpye, S of Sheldon, in 1st Lime, Lead.

Maiden Rake, W of Little Hucklow, in 3rd Lime, Lead, Ore in Toadstone, 4 chance Toadstone beds!

Mandale Pipe and Rake, in Over Haddon, in 1st Lime, Lead, wide, one part hades, a very old Mine.

Maury Flat-works, in Taddington, in 2nd and 3rd Lime, Lead, Pyrites, Ore in Toadstone.

May Sough, in Great Hucklow, in 1st Lime, Lead.

Meers, in Brassington, in 4th Lime, Lead, White Ore, Green Ore.

Meers, in Cromford, in Shale and 1st Lime, Lead, Calamine, Cawk.

Meerbrook, in Wirksworth, in Shale and 1st Lime, Lead, found in 1807 in the forefield of the new Sough.

Merlin's Mine, in Eyam, in 1st Lime, Lead, a Cavern and beautiful Stalactites, Stalagmites, &c. Gravel.

Middle-ditch, in Middleton by Wirksworth, in 1st Lime, Lead, Calamine.

Middle-field, at Foolow, in Eyam, in 1st Lime, Lead.

Mill-close, in Wensley, near Darley, in Shale and 1st Lime, Lead, Ore in Shale, Hazle Nuts?

Mill-dam, in Great Hucklow, in Shale and 1st Lime, Lead.

Millers Pipe, NW of Castleton, in 1st Lime, Lead, yellow transparent Fluor.

Mixon, in Upper Elkstone, E of Leek, in Staffordshire, in Shale Limestone, Copper, Lead.

Mockshaw, or Hare-dale, NW of Bakewell, in Shale Limestone and 1st Lime, Lead, chance Toadstone beds, clay Wayboards.

Moseley Groove, at Foolow, in Eyam, in 1st Lime, Lead.

Moss Rake, in Bradwell, in 3rd Lime, Lead, Cawk, a large Spring of Water, large Hillocks.

Mossey-Meer, in Winster, in 2nd Lime and Toadstone, Lead, White Ore, Green Ore, ochrey Clay.

Mouldridge, near Pike-Hall, in Bradburne, in 4th Lime, Lead, Calamine.

Mule-spinner, in Bradwell, in 3rd Lime, Lead, Bagshaw's Cavern in it, beautiful Stalactites, &c.

Mullet-hill, or Stoney-way, in Matlock, in Shale and 1st Lime, Lead, corrosive Water.

Nay-green, in Little Longsdon, in 1st Lime, Lead.

Nester's or Nestus Rake, on Masson Hill, in Matlock, in 2nd Lime, Lead, Calamine, Black Jack.

Nether-hay, in Matlock, in 1st Lime, Lead, chert Breccia.

Newhaven Mine, near Newhaven-House, in Hartington, in 4th Lime, Lead, White Ore.

New Rake, in Castleton, in 4th Lime, Lead.

Nick-sough, W of Yolgrave, in 1st Lime and Toadstone, Lead.

Noger-hole, on Middleton Moor, in Wirksworth, in 3rd and 4th Lime, Lead, clay Wayboards.

North-Cliff, in Wirksworth, Shale and 1st Lime on E, and 3rd and 4th Lime W, Lead, cubic transparent Fluor, wide, the great Limestone Fault through it.

Nunleys, S of Pindale, in Castleton, in 3rd Lime and Toadstone, Lead, Calamine, Black Jack, Ore in Toadstone*, worked by a *horizontal drift* or Gallery.

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* As truly observed by M. de St. Fond, in his Travels, page 329; notwithstanding the flippancy of Mr. Mawe in denying it, who examined *a different Mine*, into which he could only descend by a *Shaft*.

Nursery, N of Hopton, in Dunstone or 3rd Toadstone, Lead, Copper, soft Clay, Ore in Toadstone.

Nursery-end, in Carsington, in 4th Lime, Lead, Calamine.

Oakcliff, W of Wirksworth, in 3rd Lime, Lead, Calamine.

Odin, NW of Castleton, in Shale and 1st Lime, Lead, Black Jack, Fluor, Cawk, elastic Bitumen, Selenite, Sulphur, Slickensides, hades S, Vertebra? a very old Mine.

Old Isaac's-venture, in Elton, in 1st Lime and Toadstone, Lead, Ore in Toadstone.

Old Nester's or Nestus Pipe, on Masson Hill, in Matlock, in 2nd Lime and 2nd Toadstone? much Lead, Calamine, a very old Mine.

Old-Tor, N of Winnets Dale, in Castleton, in 4th Lime, Lead, coloured Fluor.

Orchard Pipe, in Winster Town, in 1st Lime, Lead, 150 yards wide! Caverns in it.

Orchard, in Wirksworth, in Shale and 1st Lime, Lead, Cawk, cubic transparent Fluor.

Overton, in Ashover, in 1st Grit, Shale, and 1st Lime, much Lead, Cawk, large Crystals of Calc. Spar.

Ox-close, at Snitterton, in Darley, in Shale and 1st Lime, Lead, clay Wayboards.

Oxlow Rake, in Peak Forest, in 3rd and 4th Lime, Lead, 6 yards wide!

Peak Pipe, at Calver, near Hassop, in 1st Lime, Lead.

Pearson's-venture Pipe, near the Cliff, in Crich, in 1st Lime, Lead.

Pens Rake, in Wirksworth, in Shale and 1st Lime, Lead.

Perseverance (formerly White Rake), in Carsington Pastures, in 4th Lime, Lead.

Picture-end, at Hazlebadge, near Bradwell, in Shale and 1st Lime, Lead, yellow Fluor.

Pindale. See *Nunleys.*

Placket Pipe, in Winster, in Shale and 1st Lime, much Lead, wide, with Caverns, one 120 yards high!

Portaway, near Eldon Hill, in Peak Forest, in 3rd and 4th Lime, Lead.

Portaway Pipe, in Elton and Winster, in Shale and 1st Lime, much Lead, Black-Wad, 200 yards wide! Gravel.

Porters', in Bonsal, in 1st Lime and Toadstone, Lead.

Prince-Charles, NW of Wirksworth, in 3rd Lime, Lead, Calamine.

Providence, N E of Brassington, in 4th Lime, Lead, White Ore.

Putty-hill, in Brushfield, in 2nd Lime, Lead, Calamine.

Raddle-pits, in Bradwell, in 3rd Lime, Lead, yellow and red Ochre.

Ranter, or Raven-tor, in Wirksworth, in Shale and 1st Lime, much Lead, White Ore, Black Jack, Pyrites, Ochre, Cawk, Taylor's Vein very hard Spar, wide, hades E, a Fault through it, the SW side highest by 162 yards! skirts dropt down, a Cavern.

Ratchwood, in Wirksworth, in Shale and 1st Lime, much Lead, Black Jack, Cawk, cubic transparent Fluor, crossed by a Fault at its W end.

Rath-Rake, in Elton Town, in 1st Lime, Lead.

Raven Tor, in Crich, in 1st Lime, Lead.

Red-mineral, S of Newhaven-House, in Hartington, in 4th Lime, red Iron Ore? pretended Cinibar.

Red Rake, near Sheldon, in Bakewell, in Shale Limestone, Lead.

Redseats, E of Castleton, in 1st Lime, Lead, Calamine.

Ribden, near Caldon, Staffordshire, in 4th Lime, Lead, Copper?

Riletch, NW of Upper Elkstone, in Staffordshire, in Shale Limestone, Copper.

Robinstye Flat-work and Rake, in Over Haddon and Meadow-place, near Yolgrave, in 1st Lime and Toadstone, Lead, Ore in Toadstone, the great Bakewell Fault crosses it.

Robin-wash, in Great Longsdon, in 1st Toadstone and 2nd Lime, Lead.

Rowbottom, in Crich, in 1st Lime, Lead.

Rutland. See *Cumberland* Mine.

Sallet-hole, in Great Longsdon, in 1st Lime, Lead.

Salters-way, near Bright-gate, in Bonsal, in 2nd Toadstone and 3rd Lime, Lead, chance Toadstone beds, and filling fissures?

Samuel, or Samuel-engine, on Middleton Moor, near Wirksworth, in 3rd and 4th Lime, Lead, squinted N, deep, large Hillocks.

Sand-hole Pipe, SW of Wirksworth, in detached 4th Lime, Lead, Gravel.

Seedlow, in Wardlow and Stoney Middleton, in 1st and 2nd Lime, Lead.

Seven-Rakes, near Matlock Bridge W, in 1st and 2nd Lime, Lead, Black Jack, Ore in Toadstone, Fluor, Gravel, Bones and Teeth.

Shaw-engine, in Eyam, in Shale and 1st Lime, Lead, Ore in Shale, Allum? vegetable impressions in the Shale.

Shuttle, N E of Tideswell, in 3rd Lime, Lead.

Side-Rake, near Starkholmes, in Matlock, in Shale and 1st and 2nd Lime, Lead, Ore in Toadstone.

Side-way, in Callenge-low, near Monyash, in Yolgrave, in 1st Lime, Lead, a crooked Rake.

Silence, in Grindlow, near Eyam, in 1st Lime, Lead.

Silver-hillock, in Great Longsdon, in 1st Lime, Lead.

Slack, near Bright-gate, in Bonsal and Wensley, in 2nd and 3rd Lime, much Lead, chance Toadstone beds, and filling fissures?

Slack, on Middleton Moor, near Wirksworth, in 3rd and 4th Lime, Lead, squinted N, deep.

Small-dale-head, in Bradwell, in 1st Lime, Lead, Tigre-stone Fluor.

Smiling-fancy, in Elton, in 1st Lime, Lead.

Smithfield, at Bridge-town, in Wensley, in 1st Lime detached, Lead, Kessel?

Selms, in Wirksworth and Middleton, in 3rd Lime, Lead, Gravel.

South-side, in Stoney Middleton, in 1st Lime and Toadstone, Lead, Pyrites.

Spar-Rake, W of Middleton by Wirksworth, in 3rd Lime, much Lead, a Wayboard in 4th Lime.

Speed, in Grindlow, near Eyam, in 1st Lime, Lead.

Speedwell, or Lanehead Pipe, in Castleton, in 4th Lime, a trial, Foreside Cavern and Water-fall in it.

Stafford's-dream, or Dream, W S W of Wirksworth, in 4th Lime detached, much Lead, Ochre.

Stanton-Park, in Stanton-Harold, Leicestershire, in yellow Limestone? Lead, Black Jack, Pyrites.

Stone-pit Mine, in Over Haddon, in 1st Lime, Lead, rounded Bloodstones, the last Mine opened.

Stoney-Lee, in Stanton in the Peak, in Shale, coarse

Shale-Grit (see p. 228) and 1st Lime, Lead, very large Crystals of Cal. Spar.

Stoney-way. See *Mullet-hill*.

Stubben, E of Bonsal, in 2nd Lime and white Chert, Lead, Steatite.

Suckstone, in Brassington, in 4th Lime, Lead, Steatite, China Clay.

Tanner's-venture, at Hazlebadge in Bradwell, in 1st Lime, Lead, yellow transparent Fluor.

Thawswood-Dale or Thornwood, in Stanton, near Wooton in Staffordshire, in 4th Lime, Lead, Calamine, hades.

Thistley, in Wirksworth, in Shale and 1st Lime, Lead, hades much, skirts dropt down.

Thornhill-slack, S of Tideswell, in 3rd Lime on N and 3rd Toadstone S, Lead, a Fault through it.

Tidslow-Rake, in Eyam, Grindlow, Great Hucklow and Tideswell, by various Names, in 1st and 3rd Lime, Lead, the great Limestone Fault crosses it in Hills Rake.

Tinley, in Cromford, Shale and 1st Lime, Lead, Ore in Shale.

Town-head Mine, in Ashover, in Shale and 1st Lime, Lead.

Townsend, at Overton in Ashover, in 1st Lime and Toadstone, Lead.

Trafalgar, or Willow, in Winster, in 1st Lime, Lead.

Turnip-close, in Monyash W, in 2nd Lime, Lead, clay Wayboards.

Twelve Meers, in Eyam, in Shale and 1st Lime, Lead.

Venture, in Cromford, in Shale and 1st Lime, Lead, plumose white Gypsum.

Virgin Mine, at Hazlebadge near Bradwell, in 1st

Lime and Toadstone, Lead, Sulphur in Toadstone, Slickensides, a Skul and Teeth?

Upper-field, in Brassington W, in 4th Lime, Lead, Green Ore, China Clay.

Wall-close, in Wirksworth, in Shale and 1st Lime, Lead, White Ore.

Wam, or Wham, in Sheldon, in 1st Lime and Toadstone, Lead, crosses Hubberdale Pipe.

Wards Scrin, in Crich, in 1st Lime, Lead.

Warm-bath, near Sheldon, in Bakewell, in 1st Lime and Toadstone, Lead, Ore in Toadstone.

Water-Groove Pipe, at Wardlow-Mires near Foolow, in Shale and 1st Lime, Lead, Softs.

Water-hole, in Hassop, in 1st Lime, Lead, hades.

Water-hull Pipe, N W of Castleton, in 4th Lime, yellow Ochre, fine coloured Fluors.

Weather-Rake, E of Castleton, in 3rd and 4th Lime, Lead.

Well-close in Brushfield, in 2nd Lime, Lead, Black Wad.

Wells Rake, in Stanton in the Peak, in 1st Lime, Lead, Pyrites.

Westedge in Ashover, in Shale and 1st Lime and Toadstone, Lead, Black Jack, Ore in Toadstone, Fluor, Fibrous Spar, Petroleum in Lime Geodes in Shale, Slickensides, a Fault through it? vegetable impressions in Shale.

Wet Rake, in Castleton and Bradwell, in 3rd Lime, crosses several Rakes.

Wheels Rake, in Over-Haddon, Alport and Stanton, in Shale and 1st Lime, Lead.

White-low Mines, near Ible in Bonsal, in 3rd Lime, Lead, much Calamine.

White Mine, in Brassington, in 4th Lime, Lead, White Ore.

White Rake, in Great Hucklow and Tideswell, in 1st and 3rd Lime, Lead, White Ore, Green Ore, Ore in Toadstone, Toadstone Riders ? a Fault crosses it.

Wig-twizle, near Bolterstone Chapel, NW of Sheffield, Yorkshire, in Grit (perhaps alluvial), Lead, Black Jack, Copper ?

Windmill, in Wensley near Darley, in Shale and 1st Lime, Lead, very wide, soft dirt in it.

Wire-Mill, in Alveton, Staffordshire, in alluvial Grit Rock, Copper.

Yate-stoop Pipe, in Winster, in Shale and 1st Lime, much Lead, the Vein crooked, a shaft 230 yards deep, a Steam-Engine under-ground formerly.

Yeild, in Middleton by Wirksworth, in 1st Lime, Lead, Calamine, hades much, skirts dropt down.

Yoke-cliff, in Wirksworth and Hopton, in 3rd and 4th Lime, Lead, three ribs of Ores, hard Spar, wide, hades S, the great Limestone Fault through the E part of it.

What I have said in the pages preceding this List, and what is to follow in this and the next Section, respecting Minerals, makes it necessary here only to observe, that the Strata or Measures which I have mentioned above, have not all Ore, or even the Vein found in them, in every case, but occur only in the sinkings of the Shafts, in many instances, being here enumerated, for pointing out so many opportunities of examining or enquiring into the thicknesses and nature of the Strata mentioned, by those who may wish to examine the truth of my general description of these important

Strata, or by those who may laudably concur with me, in the great labour, of collecting materials for a complete *natural history of each Stratum*, a task which can only be fully effected, by the united labours of many resident and critical observers of the Strata, as they happen from time to time to be penetrated by Shafts, Wells, Mines, Quarries, &c.: and which probably will remain long unattained, without the establishment of local Geological and Mineralogical Societies, as recommended page 217.

Where two adjacent Limestone Rocks, or Limes, are mentioned, as 1st and 2nd, 2nd and 3rd, or 3rd and 4th, the 1st, 2nd, or 3rd Toadstone respectively, which is between them, is always to be understood; except in the cases where a Fault *crosses* the middle of a vein, when this is not always the case. When a Toadstone is mentioned without a number, it is always that of the Lime preceding it, which it under-lays. Where "much lead" is mentioned, they are Mines where much Ore has been got, or is now getting; many of the Mines herein, having been long discontinued, and shut up. Caverns and large Shake-holes, being most common in the 4th Lime, I shall notice them more particularly further on. Odin, Mandale, and Old Nester's, are reputed to be the first Mines which were opened in this district.

Before I quit these Limestone and Basaltic Strata, it may be right to mention a few of the most prominent features of each, viz.

First Limestone Rock.

The upper *beds* of this Rock are often dark coloured or black, and stink much when struck with a hammer, the Swine-stone of some Mineralogists; and near the top, layers of black Chert Nodules often occur, similar in their arrangement to the Flint Nodules in Chalk; large Anomia Shells, and others of smaller size, are also common in these upper beds; near the middle of the Rock, vast assemblages of Entrochi* occur, forming the figured, grey and birds-eye Marbles, with others; in some places, where these Entrochian Beds happen to basset, under a thickness of rubble and loose soil, blocks of it are ploughed up, completely changed to *chert*, except the shells, which are decomposed and gone, the casts of the inside of the Entrochi being denominated Screws, but which they little resemble, the flutes being square to the axis, as though turned in a lathe, and not inclined spirally, like a screw. At Greenwood-field in Cromford, Longstone-edge, Overton S of the Hall, and Salters-way WSW of Matlock Bridge, these loose screw-stone blocks or burs, have been procured in considerable quantities, and were applied formerly in constructing *Mill-stones*, as a substitute for those made of French Burs. The transmutation or transformation of some sort, of Limestone into Chert, in these and numerous other instances, when it is exposed on or near to the surface, cannot be disputed, however difficult it may be to account for any such changes. Besides the layers of Nodules of black Chert in this Rock, which seem to occur only locally and not universally, in some fewer instances, large beds of the stone itself, seem to me, to be converted into white Chert, called *China Stone*, of which considerable quantities are sent off to the Staffordshire Potteries and to the Flint-Mills, from the Quarries at the N end of Bakewell Town, and N of Little Longsdon: on the NW of Haddon-Hall, near Bakewell, a considerable mass of Chert also appears, in a Lime Quarry. Five regular Wayboards of Clay, or more, occur in different parts of this Rock. Several of the beds of this 1st Lime Rock, contain Madrepores, and other curious Organic remains. Of its chance Toadstone beds in Mockshaw Mine, I shall speak further on.

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* The various species of this curious fossil Animal, are drawn and described in Mr. James Parkinson's "Organic Remains," vol. II.: those peculiar to the Derbyshire Strata, will also be found in Mr. William Martin's "Petrificata Derbiensia," vol. I.

Second Limestone Rock.

In this Rock, several of the beds contain Magnesia; a specimen taken from some of the upper beds, on the W side of Matlock-Bath Dale, by Mr. Tennant, yielded on analysis, 22 per cent. of Magnesia (see Philosophical Transactions, 1799, p. 308) On Masson Hill, in Matlock, and on Over Haddon Pastures, the superficial beds seem, in part converted to Chert, being most curiously and regularly cracked, and are unfit for Lime-burning; here and in other places, these beds or blocks are usually called *Dun-stone*, or Bastard Limestone. Some few beds in this Rock contain Entrochi, and it is subject in places to accidental masses of white Chert, or China Stone, of which there is a quarry called Stubben, ½ *m*. N E of Bonsal Church; and towards its lower part, it has beds of very black Limestone, or *black Marble*, of which there are Quarries, in descending into Monsal Dale from Little Longsdon, and ½ *m*. N N W of Tideswell, &c. It also contains Wayboards of Clay.

Third Limestone Rock.

The upper beds of this Rock are often dark coloured, and contain layers of Nodules of black Chert; very large and smaller sized Anomia Shells, Madrepores, &c.; sometimes the beds are quite black, as at Cressbrook Cotton-Mill, in Monsal Dale, &c. Like the preceding Rocks, parts of its mass seems sometimes converted to white Chert or China Stone, of which there is a Quarry 1 *m.* NW of Bonsal. I have seen a bed full of small Entrochi in it, near Dove-hole, in Peak Forest; on the SW of Slaley, a good Freestone, with Anomia and other Shells in it, is dug at Mr. Wass' Quarry, and is sometimes called Shell Marble; this Rock contains Wayboards of Clay: towards the lower part of it, some dark beds of Limestone are very full of white Madrepores, and by their conspicuous appearance in the fence Walls in Hartington, Chelmerton, and other places, have often assisted me, in finding the basset of the 3rd Toadstone, in places where the same assumed a yellow hue, not unlike Limestone, without a minute inspection, as I shall shew further on.

But the most extraordinary circumstances attending this 3rd Lime Rock, are the beds of *chance Toadstone* which it contains (similar to what I have shewn with respect to the anomalous Masses of the Red Marl, page 151, and of the Limestone Shale, page 228); these occur in Maiden Rake, on Tideswell Moor, four in number, and one or more of them, in the adjacent Mines called Calve-stone, Chap-maiden, and others, mentioned by the late Mr. Whitehurst, in the 1st Edition of his "Inquiry concerning the Earth," page 161, where *very thin* Toadstone is mentioned; while Black-hillock Mine, at no great distance, was sunk, through some of the 3rd Lime, and *through* the thick 3rd Toadstone (near to its regular basset), as appears by the Water which burst suddenly in at the bottom of the Shaft, and forced the discontinuance of the trial which was making, to discover White-Rake Vein in the 4th Lime below; a trial suggested only by the grossest ignorance of the Strata; since the regular basset of the 4th Lime within ½ *m.* W of the spot, and its extension across all Peak Forest, might have shewn, above-ground, that there was no such Vein as they were in search of, or at least that it had no importance or value.

Since the vast and indefinite inequality of the thicknesses of the Toadstone in this place, has been a principal fact adduced, in support of the opinions advanced by Mr. Whitehurst, as to the Derbyshire Toadstones being *Lava**, of subsequent formation and injection among the Limestone Rocks which they interlay, I have procured an accurate Plan of this part of the Moor, from Mr. George Unwin, the Surveyor for its Enclosure, and have been at great pains to see as many as possible of the old Miners, who worked in Black-hillock Shaft, and in the Mines near, at and prior to the time when Mr. Whitehurst obtained his information respecting them, from Mr. W. Haigh, as well as since. Which particulars, when I have the opportunity of submitting them at length to the public, will shew, that Mr. Whitehurst (of whose veracity I have before expressed my perfect conviction) was entirely misinformed and deceived, as to the points in question:

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* It should be observed, that the confident expressions on this head, of a late Writer, Mr. Westgarth Forster, in his "Treatise on a Section of the Strata," Newcastle, 1809, p. 46 and 109, are made, on the authority of Mr. Whitehurst's Book, Mr. Mawe's, and of Mr. Brown of Derby (p. 45). Had this Gentleman, whose work in most other parts displays such accurate knowledge of the Stratification, examined this district himself, I feel confident, that he would have seen and represented it in a very different light.

not that I mean to contend, that the Toadstones preserve their thicknesses as uniformly as some other strata do, Coal-seams in particular, for I have mentioned, and shall further on, shew them to be very anomalous in this respect; yet they are not more so, I expect, than many other Strata will prove, when sufficiently investigated. The Riders, at the surface of the Vein called White-Rake, a little S of Chap-maiden Mine, in Mr. Haigh's Plan of Mines on Tideswell Moor, have greatly the appearance of Toadstone, and are, I expect, similar to what have been represented to Mr. Whitehurst, as *fissures filled with Toadstone* on Bonsal Moor, p. 160 of his Work above quoted, at which place Gorsey-Dale, Salters-way, and Slack Mines, shew again the chance beds of Toadstone in this 3rd Limestone Rock, of which I am speaking, though distant near 15 *m.* from the former place: and in Tideswell Dale, S of the Town, at the entrance of a small Vale called Brees Dale, alternations of 3rd Limestone and Toadstone are to be seen in the Cliff. Mockshaw or Hare-dale Mine, W of Bakewell, presents similar chance Toadstone beds, in the 1st Lime, if I am rightly informed; while the entrance to Hockley Lime Quarry, at the S end of Ashover Town, shews nodules of Limestone in the 1st Toadstone: and it just occurs to me, while writing this, that what after much puzzling appeared to me to be Hummocks of the 3rd Lime near Harboro Rocks, and near the Via-Gellia Road, see p. 241 and 242, may prove to be large flat nodules or chance beds of Limestone in the 3rd Toadstone? as also, that what seemed to me to be *sunk pieces* of the 3rd Toadstone, in Great-Rocks Dale, and perhaps at Little-banks also, see page 242, may prove to be chance beds of Toadstone near the top of the 4th Lime? Mr Pilkington, also, I observe, mentions Toadstone of a wedge-like form, seen in a Mine near Hopton ("View of Derbyshire," vol. I. p. 195), which not improbably refers to a chance bed or to a Rider of Toadstone, in and near the top of the 4th Lime?

The *Toadstones* of Derbyshire shew strongly, the labour and difficulty which will attend the assigning of Mineralogical characters to *Strata*, however easy it may be to apply such to *hand Specimens* in a Cabinet, since a large Cabinet might be filled with Specimens, whose external characters differ materially, and a volume almost might be filled, with minutely describing the various substances and appearances which these curious strata present. Their most general appearance is that of a compact, hard, and ferruginous Stone, somewhat of the colour of the back of a Toad, whence the provincial Name most in use, and which I have used herein, as preferable, as a general Name for these Strata, to any of those which different Mineralogical Writers have assigned to particular substances, nearly if not exactly resembling some parts of these Derbyshire Toadstone strata[*]; which frequently effervesce strongly with acids, and contain globules of whitish calcareous Spar, from the size of pins heads to that of hazle nuts, or larger; which nodules, on exposure upon the surface, fall out, and shew most exactly the appearance of bladder-holes, in a mass which has been fused. When in a decomposing state on the surface, it often shews a boily and nodular texture; this is very observable N of Grange-mill, and N of Bakewell: while at Long-Lane and Knot-Low, S E of Wormhill, the smallness and hardness of these cores or nodules, give very exactly the appearance of rounded pebbles: and yet in other places, particularly on the E of Litton, Toadstone is so perfectly stratified, that lamina almost thin enough for House Slates might be got in it. In some places it appears like Breccia, and near, it has a porous or cinder-like form; these last are seen N E of Hopton Hall. In many places it appears, both in deep Mines and at its basset, as a plastic *Clay*, often of a bluish grey colour, where the numerous Meers or Cattle-Ponds of this district, occur upon its basset edge, as will be further noticed in Sect. 6. In these soft Clays, masses of Basalt, Ferrilite, and others of the hardest stones of this class occur; and in some few instances, as on the N side of Green Fairfield House 1¾ *m.* E of Fairfield, these blocks so cover the surface of the ground, as to prevent cultivation, as is said also to be frequent, on the bassets of the decomposing Basalts of Scotland (see Williams's "Mineral Kingdom," 2nd Edit. I. 417). In many instances these Toadstone Blocks, found in Clay of their decomposition, assume regular shapes; at the entrance of Peak Forest from Tideswell Moor, in particular, these have regular angles and facets, like parts of pentagonal Basaltic columns*: while in numerous other instances, a solid Rock of very dark coloured stone is seen, answering instead of cast Iron for some purposes, as is seen on many Mine Hillocks, where the hard Veinstuff is pounded upon slabs of it, called their Knockstone, instead of the thick plates of Iron, used in other places.

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[*] The Mineralogical and Provincial Names alluded to are, Amygdaloid, Black-Clay, Black-Stone, Basaltes, Bolder-stones, Brown-Stone, Cat-dirt, Channel, Chert, Clay, Dun-stone, Ferrilite, Fiery-dragon, Freestone, Jew-stone, Lava, Rag-stone, Toadstone, Trap, Tuft-stone, Whin-stone, &c. &c. Dr. Millar denominates them *Secondary Traps*. See 2nd Edit. of Williams's Min. King. p. 186 of Vol. II.

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* In the Cave Dale, at Castleton (see p. 65), the 3rd Toadstone presents a very perfect Column, as Mr. Mawe observes, p. 40 and 51. I could not perceive the Columns in Mill Dale, near Buxton (p. 69), of which St. Fond speaks in his Travels, II. 303, or see any *Win-dyke* in this place. See p. 287.

But what seems more extraordinary still, in many places between Hopton and Cronkstone, a yellow Dun-stone is seen at its basset, as already mentioned (p. 274), much resembling the 4th Limestone, without close inspection; where it appears, rather like a fine-grained silicious Gritstone, this is very remarkable in the Banks and Walls ¼ m. from New-Haven House on the Bakewell Road: while on Harboro Rocks, it actually seems a yellow and durable *Freestone*, of which the quoins of the oldest Houses in Brassington are made: just bye, it seems to produce pits of *Scowering-Sand*, and near these, excellent *Clay* for Brick and Tile-making! Of its various colours in particular places, I cannot here attempt a description; green, red, and other coloured spots and streaks in it, are said to be occasioned by Terra-vert, Jasper, Onyx, Calcedony, Hornblende, and Zeolite; in some places veins of fibrous calcareous Spar abound in it: in others, cubes of Mundic, and in some, perfect crystals of transparent Quartz.

Though in the general, the strata of Toadstone are as true and regular, as Mr. Whitehurst's several Sections, and mine in *Plate* V. facing p. 129, represent them, and are so calculated upon by intelligent Miners in their operations, yet in several instances, they have proved of very great thickness, and in others, as much thinner than usual; but in no place could I find, that the three Toadstones were wanting entirely, in their proper places; while the anomalous or chance beds of Toadstone, to which these Limestone Rocks all seem

liable,

liable, may perhaps explain most of the wonderful stories which have been related, as to its irregular and uncertain thickness. I hope I shall be excused for saying here thus much, and no more, on the Toadstone strata of this interesting district.

According to my Map, the three upper Limestones and the three Toadstones, coloured Vermillion in the Map facing page 97, occupy 51,500 Acres very nearly.

9. *Fourth Limestone Strata.*

The Rock which now only remains to be described, to complete the Derbyshire Series, coloured Orange in the Map facing page 97, and in the Section facing page 129, is the lowest, and by far the thickest, without beds of a strikingly different character, of any which occurs above it in the British Series: I have myself seen no lower Strata, and from all which I remember to have read or heard, am inclined to think, that this thick 4th Lime Rock, is the lowest which is any where seen in England: not excepting the Rocks of Devonshire and Cornwall, which probably will appear to rank with the Red Marl, in the British Series, and so will those of great part of Wales, perhaps: the north-western parts and Isles of Scotland, and the western coast of Ireland, may present lower strata than any I can pretend to be acquainted with.

Before I proceed to the description of this Rock, I must describe the *great Limestone Fault*, mentioned pages 230 and 239, and often since, which elevates, and (by a corresponding denudation) here gives us a view of Strata, far below the surface in all the surrounding districts, for a vast distance. This curious Fault commences in the Town of Cromford, and passes up

Bonsal Dale westwardly (see page 64) with a rapidly increasing rise on the north side, which occasions the 1st Lime, which is on the surface on both sides in the Town, soon to basset, and the 1st Toadstone to appear by its N side in the Dale, and to range N, and then N E, over what is called the Wallet, to Matlock-Bath Paper-Mill, where it crosses the Derwent. The increasing rise on the N side of the Fault, as we proceed up Bonsal Dale, soon brings out the 2nd Toadstone also, in the bottom of the Dale, which ranging up the hill nearly N, passes near to Bonsal Church, and then turns rather N E, to Masson Low, where my Section facing page 129, shews its basset.

We proceed but a short way further W, along the great Fault, before the 3rd Toadstone in like manner appears in the Dale N of the Fault, and by easy degrees creeps up the side of the Dale until, when opposite Slaley, it has obtained the brink or northern edge of the Dale, along which it skirts to Ible, and then by a sweep to the E, descends into and crosses the Griffe Dale at Grange-mill (see page 67). When arrived at the upper or Via-Gellia Cupola and Lime-kiln, in Bonsal Dale, we find the 4th Limestone begin to basset on the N side of the Fault, from whence it spreads on the surface for 11 *m.* W, to near Grindon in Staffordshire, across the immensely deep Dales of the Dove and the Manifold (Dove Dale and Wetton Dale, see pages 66 and 71), which are excavated in it, in some places at least 250 yards deep, without shewing any under-strata! although probably, an immense thickness of the upper beds of this Rock have basseted, N of Parwich and Alsop, before it reaches Dove Dale. When the great Fault, skirting close under the precipitous face of Middleton Wood, has arrived opposite to the singular Dale which leads up to Slaley, it turns S, nearly at right angles, the 4th Lime accompanying its W side, across the new Turnpike Road, to a point about $\frac{1}{2}$ *m.* NW of Middleton by Wirksworth, when the basset-edge of the 3rd Toadstone emerges from it, owing to the ascent of the hill, and ranges W and then S, near to the Hopton-wood Quarries, to Wetherick's Barn, and spreading thence westward on the surface to Griffe, Harboro Rocks and Hopton, as already mentioned page 239.

From the point above mentioned, the great Fault passes W of Middleton and close to Middle Peak Rock on the E, to near Wirksworth Church, where it again turns W, nearly at right angles, and proceeds near to Yoke-cliff Lime-Quarries S, and the Windmill N, and to Hopton Village; having the 3rd Lime (and edge of the 3rd Toadstone on or near to the surface) on its western side, from Middleton to Wirksworth, and again on its N side thence to Hopton; this stratum sinking to Wirksworth, and rising again from thence to the basset of the 3rd Toadstone in Hopton, and that again to the basset of the 4th Lime from under it, further W, near Carsington.

I will now return to Bonsal Dale near Cromford, and describe the Measures on the S, and E side of the great Limestone Fault already traced. Nearly opposite, but a little W, of where the 1st Toadstone appears N of the great Fault, as mentioned above, it also appears S of the Fault, and by slow degrees creeps up the wood S of the Dale (having the 2d Lime below it); when having obtained nearly the brink or southern edge of the Dale, it crosses the new Turnpike Road, and again abuts against the great Fault E, so nearly where the 3rd Toadstone does so, W, (as above described), that without

out more extended observations, these would be taken for the continuance of the same basset-edge, and by which the 1st and the 3rd Toadstones and the 1st and 3rd Limestones would be confounded, as they always were here, I believe, by the Miners, previous to my examination of this district, in May 1808. From the basset of the 1st Toadstone, at the point, ⅓ *m.* NW of Middleton before mentioned, to the S end of the Town, the 1st Lime adjoins the Fault (sinking S), from whence to Wirksworth Church, and thence to near Wirksworth Windmill, the Shale abuts E and S on the great Fault; this east part of Shale, being occasioned by a curious *gulph*, or sunk patch of strata, near a mile long, between Middle Peak and Raven-tor; the eastern Fault, or limit whereof, ranging along Ranter Vein, as observed in the List, page 265.

For about a furlong on each side of Wirksworth Windmill, the great Limestone Fault seems to have an isolated, or raised and denudated patch of the 4th Lime on its S side (page 243), which extends about ¼ *m.* S of the Fault, and is on three sides bounded by other Faults branching, or rather perhaps one Fault, branching and returning again to the great Fault. From this place to near Newton-grange, through all the zig-zag turns of the great Fault, the Shale accompanies it on the S, and the 4th Lime on the N, near to Hopton, Carsington, Brassington, Sand-pit Low, Ballidon, Parwich, and ¼ *m.* S E of Alsop, there being several Swallow-holes near its course, as mentioned in the List further on. From near Newton-grange N N E, to Thornwood, near Wooton, in Staffordshire, passing ¾ *m.* W of Tissington, ⅓ *m.* N of Thorpe, across the Dove, on the S side of Thorpe-Cloud and Bunster Hills, past the remarkably great Springs in Ilam Gardens,

dens S of the Church, in Staffordshire, ⅓ *m.* NW of Blore, and across Stanton Moor, the Shale Limestone is on the eastern side, and the 4th Lime on the western side of the Fault, as mentioned page 250.

For about ½ *m.* SSW of Thornwood, above mentioned, Shale, covered by Gravel, occupies the east side of the great Limestone Fault, and the S E skirt of Weaver Hill, composed of 4th Lime, occupies the western side; about ⅓ *m.* N of Wooton, this Fault intersects the great Derbyshire Fault (already described, page 146), and with which it ranges and coincides for about 1½ *m.* at the south end of the famous Weaver Hills, whose high and massive strata of the 4th Lime Rock, shew by far the greatest derangement or lift of Strata, which has yet been any where ascertained, or perhaps conceived, either by practical Miners or by speculative Men, when compared with the immense plane (comparatively speaking) of Red Marl, which commences on the south side of the great Fault, at the foot of this Mountain, and which, under partial and local patches of Quartz Gravel, extends to vast distances, as already explained, page 146, &c.

About ⅓ *m.* N N E of Ramsor Village, Staffordshire, our great Limestone Fault again leaves the great Derbyshire Fault, and proceeds northward to Ribden, Haughton-cross (where there are Water-swallows), W of Caldon-Low and Town, to Water-Houses on the Ashburne and Leek Road; having in this distance Limestone Shale and Shale Grit on its W side, and vast Hills of 4th Lime on its E side; in which, E of Haughton-cross, the famous Caldon-Low Lime-Quarries are situate, whose importance to all the Country westward is such, as that a Canal branch of 12 *m.* long, from the Trent and Mersey Canal at Etruria, and

3½ *m.*

3¼ *m.* of Rail-way in addition, with most stupendous inclined Planes from the wharf at Froghall, were several years ago constructed, for the purpose of carrying away this Limestone.

From Water-Houses, where the Hamps River disappears in Summer time, after passing this Fault, the same ranges E of Waterfall, by Deep Dale, E of Grindon, N of Wetton Water-Mill, where the Manifold River disappears in Summer time, after passing this Fault (in Wetton Dale, see page 71), the same passes S of Ecton Hill and N N W of Wetton ; having the 4th Limestone on the east, and the Shale Limestone on the west, as already mentioned, page 230. This course of the great Limestone Fault, from Ramsor to Wetton, is marked by the Shake-holes or *Swallow-holes* close on its east side, into which all the rills of water, which collect upon the adjacent Shale strata, precipitate themselves, as well as the considerable Rivers above mentioned ; Water-Houses Water-Mill has no need of any tail-course whatever from it! Waterfall Brook, E of the Church, as suddenly disappears: the Manifold River falls into Darfa and other Swallows, soon after it has crossed the Fault, over which it is borne on the Alluvium in the bottom of the Valley, and in the artificial course to the Mill.

The Mines which have been sunk in this Staffordshire part of the 4th Lime, without seeing water, or any Wayboards capable of intercepting its descent, and the very open and cracked state of the Rock, concur with the Water-swallows above mentioned in proving, that Ilam-Garden Spring, and Hamps Spring a little W of it, being in the lowest opening or excavation in the Shale across this Fault, are the vents of the whole of its rain waters, and of the Shale-streams above mentioned,

tioned, which are absorbed by this Rock, and perhaps also, of much water from the Dove River, which escapes into swallows in the Rock beneath its course, towards the upper parts of Dove Dale.

The great Limestone Fault continues its route, N of Gateham and Narrow-dale, and E of Wolfscote Hall, where it crosses the Dove, but soon after crossing it again, it proceeds W of Beresford Hall, in Staffordshire, when, finally crossing the Dove into Derbyshire, it proceeds, W of Hartington Town, by Ludwell Springs, Pilsbury, Crowdycote, ⅓ *m.* W of Church-Sterndale, W of Dowall and Thirkelow; where it turns considerably to the right, and passes W of Grin Toll-bar (and of several water-swallows), and E of Gasling Toll-bar (on the Leek and the Macclesfield Roads), to near Edge-end House, 1¼ *m.* W of Buxton Crescent, where it turns again so suddenly as to form an acute angle, and proceeds nearly to join the Macclesfield Road at Wye-head Spring, ¼ *m.* W of Buxton old Chapel. In all this distance, from the S E corner of Ecton Hill, the Shale occupies the western and northern side of the Fault, and the 4th Limestone the other, with two small exceptions at Dowall, where Shale Gulphs occur, which will be mentioned further on.

At the place above mentioned, ¼ *m.* W of Buxton, the basset of the 3rd Toadstone is to be met with (from under the Hummock of 3rd Lime on which Buxton and Fairfield stand, see page 241), abutting on the great Fault, and the same ranges south on the E side of Pool's Hole entrance, and into the Plantation of Firs S E of it, where this Toadstone-basset turns E, passes on the N side of Sherbrook Dale (unconnected with a Hummock of it, S of the Dale, which extends to Staden Hill), and crosses Mill Dale with a pretty rapid north dip, which has probably made some persons take this basseting of Toadstone for a *Win-dyke* (see St. Fond's Travels, II. 303); hence it proceeds, first S E, and then N E and N W, encircling Fairfield Town, until it again joins the great Fault I am describing.

From the point ¼ *m.* W of Buxton, already mentioned, the great Limestone Fault ranges W and N of the Town, passing through the Hot Baths, one half of whose floors are of the natural 3rd Lime Rock, and the other of flag Pavement, upon the soft Fault-stuff; which also passes under the northern part of the Crescent, where it occasioned immense trouble, and the expense of the longest piles which could be procured and drove, to secure a foundation for this part of the Building, though the remainder of it is seated on a solid Rock: hence the Fault proceeds to Mill-Dale Bridge, at the E end of the Town; and then bearing N E, it meets the basset of the 3rd Toadstone again, as remarked above, and proceeds on, past Black-edge and Edge-foot Houses, to Dove-hole Cotton-Mill, at the skirt of Peak Forest: the Shale in all this distance occupying the N side of the Fault, and for a short distance the S side also, near the Grove Inn, where a *Gulph*, or narrow sunk piece of strata, extending as far S as Dr. Buxton's House, is so depressed, as to have the Shale upon it, between Rocks of the 3rd Limestone! the 3rd Lime Hummock abutting S against the great Limestone Fault for about 1¼ *m.* and the 4th Lime on the remainder, N N E of Fairfield.

At Dove-hole, water enough was collected from the Shale Hills to work a Cotton-Mill, the water from which all dropt into a hole at the wheel tail E of the Fault, as at Water-Houses above mentioned. N E of the Cotton-Mill is a basset of the 3rd Toadstone, which from the Fault proceeds first E, then S E and N, until it joins the Fault again N E of Sparrow-pit; enclosing and underlaying the Hummock of 3rd Lime, mentioned page 241.

For about ½ *m.* N N E of Dove-hole, the Shale occupies the W side of the Fault, and then, a short distance before the Turnpike Road crosses over the Peak-Forest Rail-way, it abuts against a tilted and denudated patch of 1st Lime (Loads-knowl), extending to Barmoor-clough, and almost to Sparrow-pit, and having the famous *ebbing and flowing Well*, or intermitting Spring, upon it, in what appears to me to be evidently an old Stone-Quarry, and the whole probably alike the produce of Art*, instead of Nature, as has generally been believed: after this 1st Lime disappears in going N E, the Shale again bounds the Fault on the N W, to Sparrow-pit; the whole of its south-eastern side from Dove-hole being occupied by the Hummock of 3rd Lime, above mentioned.

From Sparrow-pit, the Fault ranges on to Perry-Foot, and near to Odin Mine, in front of Mam-Tor Hill, having in all this distance 4th Lime S E, and Shale, with numerous rills of water on it from Rushop Edge, on the NW side, but which all drop into Swallow-holes in the 4th Rock, as soon as they have passed the Fault: the water thus absorbed, it is, which passing freely through the cracked and open 4th Lime Rock, supplies the immense Spring called Rushop†, or Russet, before the entrance of Peaks-Hole Cavern, in Castleton Town, and a large Torrent of thick water besides, which after heavy rains bursts out of this Cavern, as being the lowest vent which the waters in the 4th Rock have, in all this part of the Country. Another deep excavation into the 4th Lime, occurs in Wye Dale, at the mouth of Flag Dale, S of Wormhill, where two very large Springs appear, a short distance above where the lower edge of the 3rd Toadstone crosses the River (page 239), and seem to vent the water of Dove-hole Swallows, mentioned above, those from the Toadstone surface at Water-Swallows, N E of Fairfield, &c. as well as the rain-waters of a large district of 4th Lime, in and S of Peak-Forest liberty.

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* I have been told, that Mr. Thomas Goodman, of Eccles, in Chapel-en-le-Frith, has made an artificial Spring of this kind in his grounds.

† Probably this Spring was so called, from the Name of the Place 5 *m.* off, where this water is collected in rills upon the Shale, which disappear in Shake-holes, as observed in the text.

Near the Odin Mine, the great Limestone Fault makes a turn at right angles towards the S E, passes near to Lane-head, Rushop Spring, S of Castleton Town, S of Pindale, and to Edingtree; where it turns again suddenly S, and passes through Bradwell Town, and E of Hazlebadge, to near Quarters House, N N W of Great Hucklow, already mentioned page 240; the 4th Lime occupying its SW side to near Lane-head, where it is bounded for a short distance, by a detached patch of Toadstone at Little-banks (page 242), then again by 4th Lime to near the S E corner of Castleton Town, where the 3rd Toadstone basset abuts against it (see page 239), from whence to Quarters House, above mentioned, the 3rd Lime adjoins it on the S and W side. The Shale occupies all the N E and E side of this part of the Fault, from Odin Mine to Quarters House, except where the tilts and denudations have exposed the patches of 1st Lime, from under the Shale, at Odin, in Castleton Town, at and W of Pindale, and in Bradwell, which have already been noticed, in the List page 242;

and rills of water collected on the Shale, fall into Swallow-holes near it, at Hazlebadge and at Quarters House.

From Quarters House, the great Limestone Fault passes W of Windmill-houses, crossing Hills-rake Mine (see page 260), and pointing thence S, extends almost to Litton; and the 1st Lime abuts against it on the E, all the way: but on the other side, the Measures sink S as they proceed by the side of the Fault, which occasions the disappearance of the 3rd Lime, and the basseting of the 2nd Toadstone, about ⅓ *m.* SSW of Windmill-houses; which basset proceeds W, passes S of Tidslow-top Hill, and thence SW and S, surrounding Tideswell Town, which this Toadstone underlays. The 2nd Lime then for ½ *m.* declines S, on the W side of the Fault, and then disappears under the basset of the 1st Toadstone, which ranging away W, surrounds Lane-head Houses, and then turns SE to Litton Town. After this, the 1st Limestone occupies both sides of the great Limestone Fault on which I have been so long detaining my Readers, and here, on the N of Litton, it may be said to end, in the 1st Lime, the same as we began with it, in Cromford Town: between which places a line might be traced, from whence, like a second joint or hinge, the Measures turn, and take a more rapid rise towards the west*,
than

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* The case of this rise and denudation is much complicated, by a very considerable Fault, which more than three-fourths surrounds a tract, in which the Town of Bakewell is situate, and which therefore I call the *great Bakewell Fault*, that commences on the east of Beeley, in the Limestone Shale, passes therein on the S side of the Town, crosses the Derwent, and passes on the S of Haddon-Hall, where it crosses the Wye River; from whence to the Lathkil River, ¼ *m.* NW of Alport, the 1st Lime Rock is on its N side, and Shale on its south: this great Bakewell Fault then turns S, nearly along the course of the Lathkil, having Shale
on

than they did at the zig-zag Fault on the edge of Nottinghamshire, before mentioned (page 170); the multiplied effect of both of which rises are shewn, and as it were referred to a standard, by the horizontality of the Red Marl, the uppermost of the Derbyshire Strata, on the S of the other or great Derbyshire Fault, from Colwich, in Nottinghamshire, to Wooton and Ramsor (page 146), at the foot of the Weaver Hills, in

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on its E side, and 1st Lime on its W side: then turning WSW, it proceeds in the 1st Lime for about a mile; then turns north, crosses the Bradford River near Nick-sough Mine, where the 1st Toadstone abuts against this Fault for a short distance (see page 243), and proceeds in the 1st Lime W of Yolgrave, Conksbury, and Meadow-place Farm, and crosses Robinstye Mine (see page 266), and the Lathkil, SW of Over Haddon, where the 1st Toadstone, the 2nd Lime, and again the 1st Toadstone, abut E on this Fault, for short distances, with the 1st Lime on its W side: from hence this great Bakewell Fault proceeds in the 1st Lime W of Over Haddon, until it joins the S E corner of the patch of Shale Limestone (mentioned page 230), about 1 *m.* WSW of Bakewell: thence the Fault declines rather north-eastward, between the Shale Limestone and the 1st Limestone, across the end of Birds-head Mine (see page 253), and across the Wye River, ¼ *m.* above Mr. Arkwright's Cotton-Mill, where, for near ¼ *m.*, the 1st Toadstone abuts S on this Fault (see page 242), and Shale Limestone N. From hence, this great Bakewell Fault proceeds in the 1st Lime N, to near Row-Dale, then E, with Shale on its N side and 1st Lime on its S side, and then with Shale on both sides, to near Burchills; when the Fault turns NW, and proceeds in Shale till about E of Hassop, when it turns E, and passing between Bramley and Bubnell, crosses the Derwent, and terminates in Limestone Shale in Barbrook Dale, as it began in Beeley: between which places a line may be traced, as a hinge from whence the included tract of Strata takes a more rapid western rise, than in the adjoining tracts N or S of it, and which occasions the denudation, and excavations for the Bradford, the Lathkil, and the Wye Rivers, to cut through the 1st Lime, and expose the 1st Toadstone, as above mentioned, and causes the Lime suddenly to appear at Haddon-Hall, as will be further shewn in treating of the beds of the Rivers, in Section 6, of this Chapter.

Staffordshire (see p. 284), which are not improbably composed of lower beds of the enormous 4th Lime Rock, than any which occupy the surface in Derbyshire.

At Dowall, 3¾ *m.* S S E of Buxton, the astonishing dislocations which the Strata have there sustained, has occasioned a kind of bay of Shale, or *Gulph*, to notch into the 4th Rock, and another at Glutton, ¼ *m.* S E, by pieces of Strata prodigiously sunk. But what is more singular, on the N E of Dowall, we find a patch of Shale, a mile long, and near a ¼ *m.* broad, in a Vale entirely surrounded by 4th Limestone Hills; this also is occasioned by a *Gulph*, or sunk patch of Strata, surrounded by Shake-holes. On the S E of Alsop, a similar Gulph, or sunk piece of Strata, seems to occasion the Shale to notch into the 4th Limestone Hills, near $\frac{3}{7}$ *m.* in length.

The great degree of shrinking which this 4th Limestone seems to have undergone, has opened in it vast Shake-holes and Caverns in different places, as may be gathered from what has been said above; the other Lime Rocks have also their Opens and Caverns, though in a less degree: it may amuse some, and be useful to others, to present the following, viz.

A List of remarkable Natural CAVERNS *and Holes in the Rocks, in and near to Derbyshire.*

Bagshaw's Cavern (or the Crystallized Cavern), in Mule-spinner Mine, SW of Bradwell, 400 yards long, in 3rd Lime, see p. 263.

Bamford Hole, a Cavern in Middleton Dale, near Eyam, in 1st Lime (Pilkington, 1. 78), see page 69.

Bondog-hole Mine Cavern, in Middleton by Wirksworth, in 4th Lime, Stalactites.

Bull Pit, E of Perry-Foot, in Peak Forest, a deep open Hole, in 4th Lime.

Callenge Low, S E of the Farm House, near Monyash, deep open Holes, in 1st Lime.

Charleswark Cavern, in Middleton Dale, near Eyam, in 1st Lime (Pilk. I. 78).

Chelmerton Cavern, in Marl-Dale, W of Chelmerton, in 4th Lime (Pilk. I. 76).

Creswell Crags, E of Elmton, adjoining Notts, small Caverns in yellow Lime.

Crosslow Mine Cavern, in Foolow, near Eyam, in 1st Lime: Ore was dressed in this Cavern, instead of being drawn to the Hillock.

Cumberland Cavern (or Rutland), at Matlock Bath, in 2nd Lime, 3 clay Wayboards in it (Pilk. I. 161).

Devil's Hall, in Fore-side Mine, at Castleton, in 4th Lime: connected by a Tunnel with Speedwell Mine.

Dove-hole Cave, in Dove-Dale, near Hanson-grange, in 4th Lime.

Dove Pit, at Dowall, in Hartington, a very deep open Hole, in 4th Lime.

Drake Mine Cavern, in Winster, in 1st Lime.

Duss Pit, in Eyam, an open Hole, in 1st Lime.

Elden Hole, N of Peak Forest Town, a very deep open Hole, in 4th Lime, connecting with vast lateral Caverns below. John Lloyd, Esq. of Wigfair, in North Wales, descended into this Hole, and has fully described it, in the 61st vol. of the Phil. Trans.

Godfrey Hall, E of Hopton, a small Cavern, in 4th Lime detached.

Golconda, a very large Cavern, in Griffe, near Hopton, in 4th Lime.

Harboro-Hall, in the Rocks N E of Brassington, 2 small Caverns, the upper one enlarged by Art, in Dunstone or 3rd Toadstone.

Knowle's Mine Caverns, on Masson Hill, in Matlock, in 2nd Lime.

Merlin's Cave, S of Eyam Church, in 1st Lime, beautiful Stalactites well preserved, by the care of the late William Longsdon, Esq. the owner.

Orchard Mine Caverns, in Wirksworth, in 1st Lime.

Peaks-Hole, at SW corner of Castleton Town, in 4th Lime, the wide entrance having a concreted Breccia or Rider-like Roof. An immense stream of water vents here in rainy seasons, see p. 289.

Placket Mine Cavern, in Winster, in 1st Lime, 120 yards high!

Pool's-Hole, ¼ *m.* S SW of Buxton, a long Cavern, in 4th Lime (Pilk. I. 67), a large stream of water vents here in very rainy seasons.

Ranter Mine Cavern, in Wirksworth, in 1st Lime.

Reynard's Hall and Cave, Caverns, with a natural Arch before the Hall, in Dove-Dale, near Hanson-grange, in dead Veins in 4th Lime.

Thor's House, or Thyrsis's Cavern, in Wetton Dale, WSW of the Town, in Staffordshire, in 4th Lime, a fine natural Arch.

A number of Shake-holes, less remarkable for their size or appearance than the above, and often occurring near to the principal Faults, are called Swallow-holes, from their swallowing or absorbing small rills, and even large streams of water, in some instances; this following, is

A List of WATER-SWALLOWS, *or Holes in the Rocks, into which Streams of Water fall and disappear, in and near Derbyshire.*

Aldwark, NW (Ducket-Wall), near Brassington, the water is collected on and falls from 3rd Toadstone into the 4th Lime.

Alsop, ¼ *m.* S E, from Shale, into 4th Lime, near the great Limestone Fault (or great L. F. see page 280).

Ashover, at the E end of the Town, two large sunk and open Holes, in 1st Lime, from Shale, into the northernmost of them.

Blackwell-Ditch, near Taddington, from Alluvia, into 3rd Lime.

Caldon, Staffordshire (Haughton-cross), from Shale, into 4th Lime, on great L. F.

Chelmerton, at S end of the Town, from 3rd Toadstone, into 4th Lime.

Dale Head, WNW of Tideswell, from 3rd Toadstone, into 4th Lime.

Dove Hole, E of Peak Forest, from Shale into 4th Lime, on great L. F. see page 287.

Dowall, N W, in Hartington, from sunk piece of Shale, into 4th Lime, at its boundary Fault (see p. 292).

Foolow, in Eyam (water-fall), a large open Hole in 1st Lime, from Shale, at a Fault: a water-fall.

Gatcham, near Wetton, Staffordshire, an open Hole, in 4th Lime, from Alluvia.

Grindlow, near Eyam (Dowse-hole), a deep open Hole, in 1st Lime, from Shale.

Grindon, near Buxton (W of Counters Cliff), from Shale, into 4th Lime, near great L. F.

Grindon N E, in Staffordshire, from Shale, into 4th Lime, at great L. F.

Hazlebadge, near Great Hucklow (S of Houses, and Pippins Hole), from Shale, into 3rd Lime, at great L. F. see page 290.

Hopton E, from Shale, into 4th Lime, near great L. F.

Monyash E (in Ricklow Dale), in 1st Lime.

Mouldridge Grange, ¼ *m*. N of Pike Hall, from 3rd Toadstone, into 4th Lime.

Parwich, ⅓ *m*. W, from Shale, into 4th Lime, near great L. F.

Peak Forest S (Dam-Dale), from 3rd Toadstone, into 4th Lime.

Perry-Foot, N of Peak Forest, a large open Hole, in 4th Lime, a considerable stream from the Shale, on great L. F. see page 288.

Rushop Edge, N of Peak Forest, 8 or 9 Holes, in 4th Lime, much water at times from Shale, at great L. F. see page 288.

Tideswell, S of the Town, from 2nd Toadstone, into 3rd Lime.

Tunstead W, and S, near Wormhill, from 3rd Toadstone, into 4th Lime.

Waterfall N E, Staffordshire, from Shale, into 4th Lime, at great L. F. see page 285.

Water-Houses, in Staffordshire, Hamps River, from Shale into 4th Lime, at great L. F. see p. 285.

Water-Swallows, in Fairfield E, from 3rd Toadstone, into 4th Lime.

Wetton WNW, in Staffordshire (Darfa), Manifold River, from Shale Limestone, into 4th Lime, at great L. F. see page 285.

The 4th Limestone Rock has very different characters, from either of the three Lime Rocks which are above it; though regularly stratified, the beds are generally of considerable thickness (except a few beds which make flag paving on Brassington Common, and at Wetton, in Staffordshire), and form in general a *Freestone*, or one which cuts or breaks with equal ease in any direction, a property which is very rare in the other three Rocks; hence in examining Fence Walls of the 4th stone, such are often distinguished by the angular pieces of all shapes, of which they are composed: its colour varies from white to a yellow stone colour; dark coloured beds are very rare in it; I remember to have seen such only near its top, on the N E of Fairfield, and very deep in its mass in the bottom of Dove Dale, at the ruins of a Stable above Lover's Leap Rock, and these I referred, but with hesitation, to *Gulphs*, or sunk patches of the 3rd Limestone (with surfaces thinly coated with Rottenstone), on account of the great Springs of water which burst in the bottom of the Dale, just N of these dark coloured beds, instead of making their way through the open 4th Rock, to the crossing of the great Limestone Fault at bottom of the Dale, as being much lower, as they do in Ilam Gardens, already mentioned, page 285; from the possibility, that there may be regular dark-coloured beds of this very low part of the 4th Rock, I have omitted them in the List of detached patches, p. 242, and consider this wonderful Dale and its collateral branches, as worthy a far more minute and laborious examination than I could bestow on them.

South of Dale-end Mill, and SW of Cummins Dale, about a furlong from the same Mill, 1¼ *m.* ESE of Buxton, this Rock produces a bed of brownish Limestone,

stone, *crystallized* in minute rhombs, and a quantity of Sand of its decomposition: I have also seen grey specimens of a similar stone from somewhere in Peak Forest. Those who mean to benefit Geological Science by their Collections, won't it is hoped, in future, content themselves with thus recording the Parish in their Catalogues, much less the County or Kingdom only, whence their Specimens were obtained, as is too common with professed Mineralogists.

Some small Entrochi occur in this Rock (as at Wetton, in Staffordshire, &c.), and numerous Anomia, and other Shells and Organic remains, throughout its whole thickness, I believe, so that the fanciful distinction of a *primitive* Rock, has no application to it, or to any others above it, in the British Series *.

In Bondog-hole and Spar-Rake Mines, near Wirksworth, a Wayboard of Clay seems to occur in this Rock, near its top, which may perhaps account for the constant Well of Water near the top of the high Hill called Castern-Low, in Hartington, page 25; and we have seen, at page 276, the probability of anomalous or chance Toadstone beds occurring in the same situation. In large open fissures in this Rock, most beautifully white *China-Clay* is found, and many coarser sorts, mixed with quartz Pebbles and other alluvia, near Newhaven House, in Hartington, and at Milk-hill Gate, near Caldon, in Staffordshire; good *Fire-Clay* being also procured in the latter place, and used at Whiston Copper-works.

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* One of the latest Writers, Dr. James Millar, of Edinburgh, in his Appendix to the second volume of Williams's "Mineral Kingdom," page 155, says, that this series of Limestone Rocks in Derbyshire, "are denominated by Werner," "*transition Rocks* (as they are called in Werner's New Theory of Veins, Eng. Transl. p. 220), and constitute his *second* class," notwithstanding, that M. Werner himself has said (p. 130 of the same Translation), that the Derbyshire "beds of Amygdaloid," and its Mineral Veins, "seem to occur in *flœtz* Limestone," or in his *third* class; and notwithstanding, that the late Mr. William Martin, who was for several years previous to his death, engaged in examining, and in publishing Engravings and descriptions of the numerous Reliquia contained in these Limestone Rocks, in a work connected therewith, his "Outlines of the Knowledge of Extraneous Fossils," p. 158, Note, had stated, that they belong neither to the *transition Rocks*, or to the *flœtz formations* of M. Werner's System.

The ease with which the excellent free Limestone of this Rock can be quarried, and broken small enough for the Lime-Kiln, compared with the grey, hard, and bedded stone of the other Rocks, is one reason why it is preferred by the Lime-burner; and has occasioned the Peak-Forest Rail-way to be cut for ¼ *m.* through the 1st and 3rd Rock (page 288), until it has quite passed the Grand Ridge, in order to reach this Rock at Dove-Hole, on the edge of Peak Forest. The principal Free-stone Quarries in this Rock will be noticed in the general List, in the next Section.

From the scaleing of my large Map it appears, that the 4th Lime Rock, coloured Orange, makes a surface in Derbyshire of 40,500 Acres.

I shall close this account of the Lime and Toadstone Districts, as I did that of the Coal-measures, p. 219, by a general List of the Minerals, and Articles produced in the Mineral or Mountain Limestone Districts, coloured Vermillion and Orange, viz.

Antimony?
Arsenic?
Asphaltum.
Barytes (sulphate).
Bastard Limestone (Dun-stone) p.273.
Bird's-eye Marble (Entrochian).
Bitumen (hard, soft, and elastic).
Black Jack (Zink Ore).
Black Limestone (stinking), p. 271.
Black Marble (p. 274)
Black Wad (Manganese Ore).
Blend (Zink Ore).
Bloodstones (alluvial).
Blue Limestone.

Blue-John (coloured Fluor).
Brazil (Pyrites).
Brick Clay (decomposed Toadstone).
Bur-stones (chert Screw-stones) p. 272.
Calamine (rusty Zink Ore).
Calcareous Sand (crystallized), p. 298.
Calcedony.
Carbonate of Lead (white Ore).
Cawk (Sulphate of Barytes).
Chert (black nodules, and white blocks), p. 272, 273, & 274.
China-Clay.
China-Stone (white Chert).
Clay (Brick, China, Fire, Tile).
Copper Ore.
Crystallized Limestone.
Diamonds, Derbyshire (Quartz Cry.).
Dog-tooth Spar.
Dunstone (bastard Lime and Toadstone), p. 273 & 279.
Figured Marbles (shelly).
Fluor Spar.
Freestone (Hopton-wood, &c. Harboro).
Galena (blue Lead Ore).
Geodes.
Gravel (on Surface).
Green Lead Ore.
Grey Limestone.
Grit-stone (Harboro Rocks), p. 279.
Gypsum, plumose, &c.?
Hot Springs.
Jasper.
Iron Ore.
Lapis Calaminaris (rusty Zink Ore).
Lead Ore (blue, green, white, yellow).

Limestone (black, blue, grey, white, yellow).
Magnesian Limestone (2nd Rock).
Manganese Ore (black, and rusty).
Marble (Bird's-eye, Black, Blue, Dove-coloured, Figured, Grey, Purple-veined, White).
Marl (soft Tufa).
Mock Ore (Zink Ore).
Molybda?
Ochre (red, yellow).
Onyx?
Petrified Wood.
Petrifying Springs.
Petroleum.
Phosphate of Lead (green Ore).
Pyrites (Brazil).
Quartz crystals.
Raddle (Ochre).
Rottenstone (on black Limestone surface).
Scowering Sand (page 279).
Silver (formerly, separated from Lead Ore).
Slickensides (on Lead-Ore, Lime, and all other substances).
Stalactites.
Stalagmites.
Steatite.
Stink-stone (black Limestone).
Sulphur.
Sulphureous Springs (corrosive, near Shale).
Swine-stone (black, stinking).
Talk?
Tallow Mineral?
Tigre-stone Fluor.
Toadstone. See page 277.
Tufa.
Warm Springs.
White Limestone.

White Marble.
White Lead-Ore (wheat-stone).
Yellowish Limestone.
Yellow Lead-Ore.
Zeolite.
Zink Ore (Black Jack and Calamine).

Some articles in the above List, either rarely found, in combination with other substances, or doubtful, are marked (?) Of several of them, some further particulars will be given in the next Section.

Having now gone through the Derbyshire Strata, and compressed into the preceding pages, from my materials intended for a larger Work, as much of a popular and interesting kind as I could, by way of *an introduction to the Sections on Soils and Minerals*, in the plan of Report prescribed by the Board to their different Surveyors, I shall proceed to the different heads therein enumerated, in order, and there give such further information as appears proper for the place, and refer back for what has been already detailed, by which means, the collating of this Report with others of the excellent ones which the Board has published, will I trust, be much facilitated.

The novelty of the design, of entering minutely into the subterranean Geography of a large district, and of referring every mass and substance therein found, to its place in *a natural Series*, with the magnitude, labour, and difficulties of the undertaking, will, I trust, plead an excuse for any material omissions, or for errors into which I may have fallen, when I assure my Readers, that I have constantly endeavoured, at the cost of no ordinary pains, to present nothing but facts, and well founded conjectures, where such are offered: and here again I request of all those who, in examining the District, may detect any circumstances, which tend strongly either to oppose or confirm the statements which I have made herein, that they will carefully and minutely note and describe such facts, *while on the spot* (as I did my observations), or as soon after as possible, and communicate them, either to me privately, through the medium of Mr. Tilloch's Philosophical and Geological Magazine, published Monthly, or any similar or other channel of public communication, which may be most agreeable to themselves: not forgetting to preserve proper *Specimens*, amply marked, as to their precise locality, &c. Since by such general concurrence we may hope, I am sanguine enough to think, ere long, to see *Geology*, that most degraded of all the Sciences, dragged from the incongruous mass of false assumptions and wild Hypotheses, in which it has lain buried, and placed by the side of its kindred subject Astronomy, among the *accurate Sciences*, in which exalted station, it cannot fail of rendering the most important services to Morality, and the best interests of our Species, as well as administering essentially to our wants and comforts.

On the general subject of this Section, viz. *the Soils of the County of Derby*, I have already mentioned (page 148) the Southern districts on a base of Red Marl, as best entitled to the appellation of the fertile districts; a term which must however be received, without concluding that other districts of the County are barren, or absolutely infertile, since few tracts exist where draining, liming, and proper subsequent management, would not render them productive of Grass or Corn, and still fewer, where draining and planting would not succeed, in proper masses, even on the highest Lands. The very thick beds of soft Peat on the high Hills, which will be mentioned further on, and the *Slither* in some valleys, page 145, seem perhaps the only tracts incapable of improvement.

1. *Clayey Soils.*

The clayey Soils of Derbyshire owe their origin, 1st, to Clayey Gravel, which is indiscriminately strewed over the County, but most extensively in the local patches of the tracts colonred brown, in the Map facing page 97, to the S and SW of Derby; the others are mentioned in the List, page 134: these are generally found difficult soils, either to drain or improve. 2nd, to Red Marl Strata, in the southern district, coloured Lake Red (page 148), frequently on Lands too much marled at a former period; these are capable of a high degree of improvement, by draining and liming. 3rd, to Coal Shales, and the other argillaceous and perishable Strata, which accompany Coal (see page 161 and 181). 4th, to the great Limestone Shale, in the districts coloured Purple, page 227); which, when it has a proper degree of tenacity, makes excellent Land, as about Hassop, Ashford, Bakewell, Ashburne N, Newton-grange, &c. &c. and very poor Land in others, as observed above. And 5th, to the decomposition of Toadstone on the surface, see page 278, as on the E of Fairfield, and other places: this Clay is said to be very unfavourable to the growth of Oaks. Cold clayey soils in this County, have numerous Pewets or Lapwings, flying and screaming over them, whence such are often called pewety soils.

2. *Loamy*

2. *Loamy Soils.*

The Loamy Soils of this County, owe, their origin, 1st, to Loamy Gravel, which is found in patches on the surface, within the tracts coloured Brown in the southern parts of the County, or detached from these, in the List page 134. 2nd, To the alluvial deposits of the Rivers and Brooks throughout the County, on the flats or Meadow* tracts by their sides, which generally rest on a bed of Gravel, but without being mixed with stones on the surface, except in some rare instances, where the rapidity of former floods, threw up Sand and Gravel out of the Brook-courses, and distributed it on their banks: the two last, produce some very good Lands, and generally speaking, such are above the medium quality. 3rd, To Red Marl, in the parts coloured Lake Red, and these are among the best soils which are known in the District, as observed above. 4th, To Yellow or Magnesian Lime Rubble, and soil of its decomposition, coloured Yellow; these are of a medium quality, as arable, but never should be permanently laid down to Pasture, for the reasons stated in page 161: Sainfoin answers well upon it, as will be noticed in Sect. 27, of Chap. VII. 5th, To Argillaceous Grit-stones of the Coal-measures, in the tracts coloured Green, mentioned page 161, whose rubble and sandy debris, in many parts, produces fields of pretty good Land. 6th, To Limestone-Shale, in the tracts coloured Purple, where Shale-Grit abounds, which often prove of good quality, as observed above. And 7th, to the Mineral or Mountain

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* I have not here used the term Meadow in its Derbyshire acceptation; which invariably implies a field which is *mown*, in distinction from a pasture, which is *fed* by Cattle or Sheep, &c.

Limestones, coloured Vermillion Red, and Orange in the Map, the rubble and debris of which, produces good pasture Land, when limed, without which inestimable improvement, great part of these Lands would be covered by unproductive Heath. In these districts, those of the 4th Lime in particular, some Hills and Commons, as in Hartington, Chelmerton, Peak-Forest, &c. where the Heath (Erica) and dry Mosses natural to these Soils, have long been suffered to continue without molestation, are subject to what they call *Fox-earth*, a ferruginous and barren substance, found like a pan or floor a few inches beneath the surface, which seems so unfriendly to vegetation, that many Farmers pronounce it incapable of any improvement: this certainly is not literally the case; but its amelioration would, I expect, be attempted by few prudent Tenants, without Leases. The Fox-bench of the Cheshire Report, page 9, seems very analogous to this Fox-earth, though found in Sand, instead of decayed Lime Rubble; and seems to confirm the ingenious suggestion of Mr. H. Holland, viz. that it is "formed by the deposition of Oxide of Iron, in the filtration of ochrey water," and to shew, as I have long thought, that the Ericas, and some other plants peculiar to barren ochrey soils, generate or collect the Oxide of Iron. My Friend, Mr. Benjamin Bevan, the Engineer, of Leighton Bussard, in Bedfordshire, first pointed out to me, this effect of the Ericas, on the Woburn-Sand Stratum (see page 112), which seems so perfectly white and pure, where secured by an impervious bed of Clay from the infiltration of water from the surface, as to lead that Gentleman and me to conclude, that a large portion of the Iron found therein is of vegetable origin, particularly a black Oxide near the surface, not inferior in sterility on the Heathy Lands of

Bedfordshire, to this Fox-earth, or the Fox-bench of Cheshire. That able and experienced Planter and Pruner, Mr. William Pontey, of Huddersfield, when he came first to inspect the late Duke of Bedford's Plantations, pointed out the reason, why a large portion of the Trees last planted by the late Colonel Moore on Wavendon Heath, near Woburn, were in a dying state, while a few among them, of various sorts, were flourishing luxuriantly, viz. that the latter happened to be planted in old shallow Sand-stone Pits, or upon the rubble thrown out therefrom, taken from beneath the black Sand on which the Heath grew: and his directions for planting were, in every instance to dig below this black Heathy Sand, for soil to plant in, and which practice succeeded perfectly: as he said it had done with him, in Heathy Lands, in various parts of England. The above observations tend strongly, I think, to shew, that the sooner those noxious plants, the Ericas, are banished from our soils, the better for ourselves and posterity.

3. *Sandy Soils.*

Sandy Soils are rather rare in Derbyshire; such as occur, seem owing, 1st, to parts of the gravelly tracts and patches, as above. 2nd, to the anomalous Sandstone and Sand beds in the Red Marl, mentioned page 148; south and north of Black-Brook Reservoir, on Charnwood Forest, in Leicestershire, very sandy red and yellow soils, seem owing to these Beds. 3rd, to the rubble and debris of the Argillaceous Rocks in the Coal-measures, in some situations; perhaps where the Argil either is less predominant in the Stone, or has been washed away out of the Sand of its decomposition, these often form pretty good Turnip Lands. 4th, to the Rubble and loosened Sand of the 1st Grit, in some parts of the Map coloured Purple; these Sands, where dry, are productive of Corn and Grass, but where much elevated, wet, and neglected, produce the thickest Peat Bogs in the County; and it is not a little singular, that the Peat anciently has grown on the most naked parts of this Rock, as the floors of the Turf or Peat Pits, for ages past worked in the Woodlands, and other high and northern parts of the Country, shew; of these I shall have occasion again to speak. And 5thly to the occasional beds of Micaceous Sand-stone, in the great or Limestone Shale (page 228), which sometimes, though rarely, produce a loose Sandy surface: in high and wet situations, Peat abounds on this Shale-stone, as on the 1st Grit, above mentioned.

4. *Chalk Soils.*

No Strata of Chalk exist in Derbyshire, or nearer to it than the neighbourhoods of Market-Raising and Caistor, in Lincolnshire, WNW*, or of Baldock, Hitchin, Dunstable, Tring, &c. SSE, in Hertfordshire and Bedfordshire (see page 112); while towards the S E, these Strata retire still further from the district comprised in my Map; and yet, such has been the astonishing distribution of Alluvial Matters, that bolders of hard Chalk are sometimes met with, and Flints very commonly, with numerous Organic Remains peculiar to the Chalk Hills, in many of the gravelly tracts coloured Brown, and in the numerous issolated patches of extraneous matter, as mentioned page 103.

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* A late Writer, Dr. James Millar, in his Appendix to the 2nd Edition of Williams's "Mineral Kingdom," vol. II. p. 208, mentions, that "near Grantham, in Lincolnshire, some fragments of a Ridge of *Chalk Hills* appear;" which mistake I suppose to have originated, from the whitened appearance of the faces of the quarries, in some parts of the Bath Freestone range (see p. 113), which has occasioned many Travellers who passed within sight of such quarries, to call them Chalk-pits, in Rutlandshire, and other Counties. The water which soaks through the Limestone, and oozes out in the face of the quarries, soon coats them with a perfect white-wash, and even the stone broken small for the Roads, often acquire this white coat, and might effectually deceive those observers, who look at such only from the windows of a Chaise.

Except the small quantities of free Chalk used by the Carpenters, &c. for writing, the want of it is little known in Derbyshire, since some of the grey compact beds of the 1st Limestone Rock, burn to a Lime, little inferior to Snow in whiteness, which seems to answer better for white-washing, &c. than the Whiting or washed Chalk of the Southern Counties.

5. *Peat.*

The Valleys and low grounds of Derbyshire very rarely produce Peat, which I attribute to the small quantity of Sand in the County, which soil I have noticed to be particularly favourable to its growth, in Bedfordshire and other Counties, and for this reason it rarely happens, that any considerable thickness of Peat is found, on the sides of the Hills where the Springs break out. Synfin Moor, or Syn-Fen, on the north side of Swarkestone, is truly a Fen, of perhaps 1400 Acres, situate on the Red Marl and Gravel, having apparently a great thickness of Peat: of this low tract of Land, I shall have occasion to say more in Sect. 1, of Chap. XII.

A little below Darwent Chapel, I saw Peat digging for fuel, by the side of the Derwent River, on Shale

Grit: in the Vale above Ednaston, near Coxbench in the Bootle Vale N NW of Derby, on Coal-measures, and in a few other places, I saw Peat in the low Valleys.

In the northern part of the County, vast beds of Peat are found on the planes of Shale-stone, and of the 1st, 2nd, 3rd, and 4th Grits; of course in the latter cases, Coal-pits are sometimes sunk through Peat, to get at the Coal-measures, as at Thatch-marsh, Goyte-moss, Stanage, and other places.

In order to understand the situation of Peat Bogs on the high Lands, within the compass of the Maps facing pages 1 and 97, a line must be traced on the large Map, beginning at Penistone, in Yorkshire, and proceeding near to Midhope, Bolterstone Chapel, Bradfield Chapel, Stannington, and Fullwood, entering Derbyshire near Ringing-low Bar, and proceeding W of Dore, W of Totley, W of Holmsfield, W of Bank, W of Grange Bar, W of Wadshelf, W of Loads, by Harwood-Grange, and Spitewinter in Ashover; then turning W, by Moor-Hall, Darley-flash, E of Fallange, E of Beeley, E of Chatsworth Park, by the Robin-Hood in Baslow, by Barbrook Slag-Mill, E of Curbar, E of Froggatt, E of Nether-Padley, E of Upper Padley, cross the Derwent to Hazleford, by High-low, NW of Abney, E of Brough, by Aston in Hope, N of Hope, N of Castleton, N of Perry-Foot, N of Malcalf, by Chinley-Head, E of Ollerset in Glossop, E of Thornsett, by Raworth, E of Charlesworth, E of Whitfield, E of Glossop, E of Padfield, and leave Derbyshire; N of Tintwistle, in Cheshire, N of Mottram, E of Stocks, E of Moor-Gate, E of Mickle-Hurst, and E of Hall-Houses at the bounds of Cheshire and Yorkshire. In which large tract, Peat of greater or lesser thickness is found, on most of the high Hills, particularly such as have a surface of Grit Rock; this Peaty and Mountainous tract, narrowing again rapidly as it proceeds N along the Grand Ridge, between Huddersfield and Rochdale, in Yorkshire and Lancashire.

The southern part of the mountain tract, circumscribed as above, is called the East Moor, and to the E, or S, or W of it, little or no Peat is found on Hills, except in a large issolated tract, almost connecting with the above, near to Chapel-en-le-Frith; which, commencing S of Bank-hall, in Chapel-en-le-Frith, we shall encircle by going first E, then S, and S E, enclosing Combes Moss, N of Buxton, and NW, W, and SW, including Axe-edge Hills, entering Staffordshire near Dowall W, by Hollins-clough, Hardings-Booth, Broadham-Oak, Repmoor-top, Heys, N of Upper Elkstone, N of Riletch, N of Mixon, E and N of Bramcote, E and N of Swithamley, E of Wincle Chapel, in Cheshire, E of Cophurst-edge, E of Forest Chapel, E of New Smithy, E of Jenkin Chapel, E of Kettleshulm, E of Lyme-Park, S of Standridge, near Disley, NW and W of Whaley-bridge, W and S of Taxhall, and enters Derbyshire again, by Fernylee, E of Ednor-Head, W of Thorney-Ley, W and S of High-Leys, S of Bag-Houses, and of Bank-hall, where we began. This large and irregular patch, having Peat on most of its high Grit-stone Hills: a circumstance unknown for a great distance S of this, in England; these Peat districts being higher than any other Lands in this part of the Country.

Where the Limestone Hills in Hartington, and others of the elevated parts, have been suffered for a long period to be covered by Heath, for want of Liming, a thin black wet earth is often formed; but this scarcely deserves the name of Peat, when compared with the luxuriant increase of aquatic plants, at some period of the world, on the Grit-stone heights above described; for it is a curious and important physical fact, that the greater part of these immensely thick accumulations of vegetables are not now in activity, but the Mosses present a dead and slowly decaying mass, thinly sprinkled with Heaths, aquatic Grasses, &c.; and yet enough of them in every part is now increasing, in the lower and wetter parts, both to shew, that the growth of this Peat belongs to the present state of our Planet, and to indicate the species of plants which composed the Peat now dead. It is abundantly evident, that the humidity of the atmosphere on these elevated planes of strata, has been sufficient to keep up the growth of Aquatics for long periods of time, after they had once been adapted to the growth of large Trees of our present species, of which the remains are now in most places found, under great thicknesses of dead Peat (crossed in all directions by Gullies or Groughs) and as the Name of *Woodlands* imply, respecting large districts, where now not a Tree or Bush of any kind grows, except in the deepest Valleys. I mention these particulars, from the hope of drawing the attention of a class of Observers, to the investigation of these phenomena, who understand Botany, and study Meteorology and subjects distinct from Geology, at least from Geognosy (according to the distinctions of the Wernerians), since Peat, or any thing like it, does not, I believe, occur, under or among regular Strata, or even under Gravel, except on the banks of rapid Rivers and Brooks, and in other situations, where causes acting in modern times could have operated, to immure such Peat. And Peat, though it often contains Wood, is evidently not composed of Ligneous Plants, in any instances which I have seen, or heard accurately described.

In general, the Mosses of this district agree with those of the middle of Ireland, as described by Mr. Richard Griffith, jun. in the 1st Report to Parliament on the Bogs in Ireland (see Philosophical Magazine, vol. 36, p. 361, &c.), except, that here the Peat originated and rests on Grit-stone, for the most part, instead of the alluvial Marles and Clayey Limestone Gravels, found under the Irish Bogs, and which also are far less elevated than the Bogs of this district.

6. *Acres of each Soil.*

It will readily be perceived from the accounts given above, that nothing short of an actual Plan and Survey of the whole County, made on purpose, could give the correct quantities of each individual soil; I shall therefore in this place, only collect together the several Strata which are distinguished by different Colours in the Map of Soils and Strata, facing page 97, viz.

No.	Colour in Map.	Names of Strata, &c.	Pages where described.	Acres.
1	Brown	Gravelly Soils - -	131 to 145	77,000
2	Blue	Lias Clay & Limestone Soils (in Leicester. & Notts)	147	
3	Lake Red	Red Marl Soils - -	146 to 156	81,000
4	Yellow	Yellow Limestone Soils -	156 to 161	21,580
5	deep Green	Coal-measures, upper part	161 to 220	150,000
6	light Green	ditto, lower part		60,000
7	Purple	Gritstone and Shale Soils	220 to 237	160,500
8	Vermillion Red	Mineral Limestone and Toadstone Soils	237 to 280	51,500
9	Orange	Fourth Limestone Soil -	280 to 299	40,500
				622,080

7. *Acres*

7. *Acres of Waste Lands.*

I am not prepared to state the Acres of Waste Lands remaining in the County, after the great number of Enclosures and consequent Improvements which have within a few years past taken place, and are now going on; but I have carefully noted all the places which have Commons remaining open, which are shewn in my large Map, of which a List will be given in Chapter XI.; I shall also present a List of the recent Enclosures, in Chap. VI.

SECT. V.—MINERALS.

The long introduction to the last Section (pages 105 to 302), has been confined, except in some few instances, which will here be referred to, to details relating to the subterranean Geography or Geology of England, and of this County and its environs in particular: here it may be expected, from the rank which Derbyshire holds as a Mining County, that I should treat, at least, generally, on its mining processes.

1*st*, *On the Discovery of Mines.*

The admirable provision of Nature, in the basseting or out-burst of Strata, for exposing to the knowledge and use of Man, the Mineral treasures which the Earth contains, has evidently first led to the discovery of Mines, in almost all situations where they are known, arising however from two very distinct causes: in the case of stratified or Stratigenous Minerals, or those which compose seams, beds, layers, measures or strata, as Coal, Iron-stone, Limestone, &c. the edge or basset of the Mineral appeared, in or under the vegetable soil, or thin alluvial covering, and from thence has been traced, or followed by its dip or inclination compared with the surface, until it has, as the Colliers express it, taken or got cover (of upper strata), and under which, generally speaking, Mineral Seams are more perfect and valuable than near their bassets, in the open-works or shallow Pits whence in the first instances, such Minerals were procured: the others are, the Venigenous Minerals, which instead of forming Strata, approaching to the horizontal, are applied as coats or linings to fissures and cracks or cavities, often nearly vertical, in certain rocky strata (see page 243), the latter class only are denominated *Mines* in Derbyshire; the other class, when deep and worked under-ground, being denominated *Pits*, as Coal-Pits, Ironstone-Pits, &c., and where shallow, are called Open-works, Quarries or Delphs, and Pits also in some cases, as Clay-Pits, Marl-Pits, &c. It rarely if ever happens, that a Mineral Fissure or Vein, does not extend from the top to the bottom of the stratum in which it occurs, completely dividing it, for considerable distances, in most instances; hence it happens, that Mineral Veins all appear on the surface, where the planes or tops of the strata peculiar to them, are exposed, or form the surface of the Earth; and such was the avidity, with which the early Inhabitants of this County, explored the surface of its Mineral Limestone Strata, under the sanction of ancient Laws or customs, which authorised any one to remove the Soil and dig in these districts, as will be mentioned further on, that I believe it may be truly said, that no

Mineral Vein in the County is of modern discovery, all of them having a communication with the surface in some part of their course, and where they were anciently known and tried by the old Men, as the Miners term it. In early times, the Veins in the 1st or upper Limestone Rock, were traced or followed from the Limestone surface, under a cover of Shale, in some instances, increasing in width and richness of Ore, as the Mine got deeper under Shale; and in more modern times, the Veins of the 2nd, 3rd, and 4th Lime Rocks (see the Section facing page 129), have been traced from the naked surfaces of Limestone, under the Toadstone stratum, which covers each of these respectively.

It is maintained by many of the best informed Miners, that in all the great space which has been explored under Shale and Toadstone, in the different Limestone Rocks, by the working of Veins which emerge from under the Shale or Toadstones, or by the driving of Soughs or Water-levels to Mines, or by Drifts, Headings, or Tunnels of considerable length made on purpose to search for Mines in different situations, that numerous as the cross-veins are which are found, all such if pursued, owing to their obliquity to the edge of the Shale or Toadstone Stratum above them, or to the indentations in the edges of such strata, are found to appear somewhere, above ground: and this circumstance has given rise to an opinion, that such appearance to day, or at the grass, as Miners often express it, is essential to the filling or richness of Mineral Veins, at the least, if not to their formation, or the rending of the Rock also, in which they are found: after comparing however the phenomena presented by the Denudations, Faults, Slickensides, Riders, Hades, Squints, &c. in these Mineral tracts, I cannot subscribe to this opinion, but think (see page 246) that the Veins of Derbyshire were formed and filled in most or every instance, as they appear at present, prior to the removal of the vast load of different Strata, which once covered this Mining District, at a period when no parts of these Veins had access, even to the waters of the universal Ocean, much less to the atmosphere, as at present. This question is however worthy of the most rigid and extended investigation, on account of its importance to the subject in hand, viz. the discovery of Mines, since, if the Miner's opinion above quoted be well founded, we have little but disappointment to expect, from further searches after Mines, except on the surface of the naked Limestone Strata (already and thoroughly explored), or near to their bassets from under the Shale and Toadstones: while, if the contrary opinion be true, we have much to hope, from the driving of Soughs or Tunnels in or upon the 1st Limestone Rock, in search of new and profitable Lead Mines, even at considerable distances from the districts to which they have been considered as peculiar; at the same time that Lime, an article still more important to the Country, as a stimulant of Vegetation, would thereby be discovered and obtained, as explained page 235.

At an early period, divining Rods and other superstitious means were resorted to by the Miners, when searching for Mines, and even in later periods, certain atmospheric phenomena, have been denominated Burning-drakes by the vulgar, and their apparent fall to the Earth, was thought to point out the situation of rich and undiscovered Veins of Ore: by which class of persons, whistling in a Mine, was supposed to frighten away the Ore, or lessen its chance of continuance: and hence they say arose the custom, that however Miners may sing or halloo when at their work, no Boy or Man is to whistle, under pain of severe chastisement from his fellow Miners.

Some valuable Mines of Lead and other Ores may yet, it is plain, lye concealed under Gravel and other alluvial coverings, and so of some Coal-seams, as hinted page 159; but a more common cause of the concealment of Coals, and other stratified Minerals, is the Faults, or vertical derangement of the piles of Strata, as will be fully comprehended by such of my Readers, as have the patience to study the various Formæ in *Plates* III. and IV. facing page 113, to whom it must appear plain, that the learning of the character of each individual Stratum, the permanent Grit Rocks in particular, and their relations to the known Coal-seams, is the best, if not the only true method of discovering Coal-seams, and of successfully opening and conducting Collieries or Coal-pits.

2nd, Boreing.

Boreing is resorted to by Miners for three different purposes; 1st, for exploring or proving the Measures, in search of Seams or Strata of Minerals, instead of sinking Shafts; which yet is always the most satisfactory means, and in some situations is little more expensive than boreing: 2nd, for letting down the Water collected in sinking new Shafts or working Mines, when a Sough, old workings, or porous strata, that have a vent for their waters, are beneath them; in Mines with a rapid dip, it also sometimes happens, that water can be let through into upper porous Measures, or into old workings, for its escape, by vertical, inclined, or horizontal boreings, instead of driving headings or levels for such purposes : or 3rd, for letting up foul and light Air or Damp to the surface, instead of sinking Air-shafts, in some situations, particularly if large augurs, such as Mr. James Ryan has lodged in the Repository of Implements at the Board of Agriculture, be used : see Williams's "Mineral Kingdom," 2nd Edit. vol. II. p. 353.

The process of Boreing, about Matlock, is as follows, viz. a shaft or well is sunk, where the soil is free of Rock, and water does not prevent it, about 11 or 12 feet deep, where the boreing is to be made, and a floor of Boards is laid on its bottom, with an augur-hole in the centre, rather larger than the intended bore-hole, a stage of boards is also laid round the top of the well on the hillock : a triangle of three tall poles is then set up over the place, having a pulley in its top, and a roll and handles between two of the poles, the rope of which passes over the pulley. A spring-pole, usually a long and straight Fir Tree, is then fixed by the butt-end, at its length's distance from the hole, either to strong stakes driven into the ground, or if large blocks of stone are conveniently at hand, such are piled on the butt-end, and others placed under the spring-pole, at a distance from the butt, allowing the small end which is over the shaft, to have a pretty wide range by its elasticity. The rods are of square wrought Iron, in four feet lengths, jointed together by a male and female screw, which rods have a round part, of about an inch in length next the male screw, and a longer round at the other end to receive the female screw, each rather larger in diameter than the diagonal of the square rod : by this means, the square part of the rod can readily be laid hold of by a wrench, or iron bar, whose end is turned twice at right angles ; and the collar, or larger round part of the rods, serves to catch the forked Iron called a pigs-foot, which is passed on and loosely keyed upon the square part of the bar, in hauling up the rods. It does not often happen, that the Measures are soft enough to be bored in the manner an auger performs this operation, but the principal operation is performed by a strong chisel or noger, as it is called, screwed on the bottom of the rod; a length of rod having an eye for a wooden cross handle, being screwed on to the top of the rod; in the top of this eye is a swivel, and ring for receiving a few feet length of chain, which being fastened by one end to the end of the spring-pole, is brought down through this ring and up again, and is hooked at such a length as will allow the spring-pole, when straight, to suspend the rods and noger about a foot above the bottom of the bore-hole. The operation then commences, by a Man at each end of the wooden handle, near the bottom of the Shaft, violently forcing or jumping down the rods, which the spring-pole as quickly raise again; a small part of a turn is then made by the Men walking round in the Shaft, and then another jump is made, then a small turn and then a jump, or cut by the noger, and so on. When six or eight inches in depth are thus loosened, or bored, which is seen by a chalk-mark on the rods, the pigs-foot, or clasp at the end of the hoisting rope, is then keyed on to the bar, and Men or stout Boys on the Hillock, by turning at the winch-handles, draw up the rods four lengths (or more in some cases); a forked Iron, called a cow-clee, which resembles the tuning-fork of a Musician in shape, is then slipped on to the square of the rod, by the Men in the bottom of the Shaft, under another pigs-foot, and the rods are let down again, so far as to rest on this cow-clee, which, by nogs of wood nailed on to the floor of the Shaft to catch it, prevents the rods below this cow-clee from turning, while by means of the winch, those rods above are unscrewed, and are set upright in the Pit: the hoisting rope is then hooked to the pigs-foot below, the cow-clee is removed, and four more lengths of rod are drawn up by the winch-handles, when the pigs-foot, cow-clee, and winch are applied again, and these rods taken off; and so on, until the noger is brought to the surface and unscrewed, and what is called a scowering bit, is screwed on in its stead: the scowering bit is like an augur, usually about four inches diameter, but is gathered further round, leaving only about an inch opening at the nose, and decreasing upwards, so as to close round and form a cylinder, at about 10 inches high, the whole length being about 2½ feet; but a hole is left near the top of the cylinder, for introducing an iron to poke out the boring-stuff from the cylinder, if necessary: the rods are then returned into the hole, by lowering and adding four lengths at a time, by help of the pigs-foot, cow-clee, and wrench, as above described: and when arrived at the bottom, the rods are held hard down against its bottom while the Men make two or three turns with the handle, in order to tighten up and secure all the screw joints; the like precaution being used before they commence drawing the rods, in case any of the joints should have partly unscrewed in the boreing or jumping operation. On some occasions, it is found necessary to use a Tee bit, or chisel, whose cutting edge resembles a T with a short top or cross, in order to widen and make the hole round, which the noger has formed; in other instances, a diamond bit, which has its cutting edge like a cross, or +, is used for the same purpose. In case of the unscrewing or dropping of the rods in the hole, a sort of double hook, called a clew, almost like the pigs-foot, but more turned up at the ends, so as to need no key or cotter, is screwed, on and let down, below the top of the rods, which generally the Men can contrive to catch in the clew, and when this is drawn up to the round part of the rod, they can be drawn by means of it. Within a short distance of the small end of the spring-pole, a strong iron pin is passed through it, so as to form two handles, by help of which, the Boys assist in forcing down the spring-pole when, as it always is at first, it is much too strong for the weight of the rods, and by means of which they lift up, to assist the elasticity of the pole, before it is necessary to change its points of bearing, or to substitute a stronger spring-pole, as the weight of rods increase, with the depth of the hole.

In all mineral districts, there are Men who undertake boreing, and who, by constant practice, can tell with great certainty, by the feel of the noger in jumping and turning round, as above described, all the changes and different known thin Measures, before the scowering bit is sent down, to fetch up the chippings and sludge formed in the operation, for the bore-hole is generally kept full of water during the operation. A strict and particular account should frequently be required from the borers by their employers, of the Measures, and their thicknesses, which they have reached, as a check on their operations; and it is a good practice, to provide them with a number of long troughs, or boxes, into which all the matters brought up by the scowering bit shall be deposited in order, and marked, for the inspection of the employer, or his more experienced agents or friends; by which precautions, much of the mistakes and frauds which are said to have resulted from the uncertainty of boreing, would be avoided, especially where honest and experienced borers are employed.

3rd, *Sinking*.

The Persons employed in digging the vertical Pits, Wells, or Shafts of Mines and Collieries, are called Sinkers, or Shafts-men, and the operation is called Sinking: among this class of Men, who generally practise boreing also, the greatest practical knowledge of the Strata, as far as regards their order and thickness, is to be expected; and when they combine a knowledge and careful search after the basset-edge of every Measure which they sink through, and of its range each way on the surface, as sometimes is the case (see page 164, Note), particularly in the neighbourhood of Iron Furnaces, and where Iron-stone Rakes are eagerly sought after, such Sinkers are incomparably the best practical source to which an enquirer can resort, for information respecting the Strata of the district in which they have usually been employed. To the many intelligent Sinkers who have assisted me in my enquiries, I am under very great obligations, as well as to the other classes of Miners and Colliers, the Agents and Proprietors of the Works, &c. to whom I have made acknowledgments in the Preface, and shall endeavour more particularly to do, in my intended Mineral History of the District.

It rarely happens in sinking Mining Shafts, that the Measures are so soft, after the corn-soil or day-earth is passed through, as to admit of being dug, until after the Pick has been laboriously applied to loosen the Measures, and more commonly Gunpowder is necessary to blast and loosen them, even where decomposition, or perishing, so quickly follows exposure to the air, that a lining of stone, brick, or timber, is necessary to keep the sides up, and prevent the Shaft from choaking or running-in; such soft or perishable strata are called Timbering Measures in many places. Shafts intended to be Timbered, or lined with Wood, are made square, or with parallel sides; while such as are to be ginged, steined, or lined with stone or brick, are round, or oval in some few cases. For shallow Shafts, a Stowse, Turn-beam, or Turn-tree, which is a rope-roll with winch-handles for Men to work, is erected over the Shaft, when dug as deep as Men can conveniently throw out the stuff; and by means of tubs, or close corves, the water and sinking-stuff is sent up; but more usually, a *Horse-Gin*, or Horse-Engine, is erected near the Shaft, having a large drum or rope-barrel, whence the Mine-ropes are conducted to pullies, fixed over the Shaft, by which means, one barrel or Corve ascends while the other descends: frequently now, small Steam Winding-engines, or Wimseys, are erected, near to deep Shafts which are to be sunk, and slide-rods are provided from its crank, for *pumping*, where the quantity of water is not too considerable; in which case, a large Steam-engine is necessary solely for Pumping, as soon as Water-measures are reached in the Sinking: the Pumps, now, being always of Cast Iron, or Sow-metal, as the Miners frequently call it, screwed together at the flanches, into what is called a Pile or Pillar of Pumps. In deep Shafts, the Pumps are disposed into different lifts, working out of cisterns let into the side of the Shaft; into which cisterns the Pumps below, deliver their water; and the Pump-rods, which are of deal, go down separately from the arch-head chains of the Engine-beam, to the different lifts of Pumps. The working-barrel of each lift of Pumps, or that length of Pipe in which the bucket moves, is usually 14 to 20 feet above the bottom, and has at its upper end a wider part, and a cover which takes off by screws, to new-leather, or do any thing at the bucket: the bottom length of Mine Pumps is called the Wind-bore, usually enlarged at two to three feet from the bottom, and diminishing thence to a point, like that of an egg, which part is full of rows of holes, ¾ or 1 inch diameter; the upper rows of these holes are plugged up with deal plugs, which the Sinkers can open or stop as the water increases or otherwise, and according to the going of the Engine. In Mr. Mammatt's Colliery at Donisthorpe, instead of these plugs of wood, the holes of the Wind-bore are surrounded by a circular apron of strong leather, made fast and tight above to the Pipe, which apron the Sinkers can from time to time turn up or down, like the Cuff of a Coat, so as to regulate the access of water, and prevent as much as possible the drawing of air by the Pumps. In sinking, the lower lift of Pumps should stand in the lowest hole which has been made in the bottom of the Shaft, and for this purpose, when a new hole has been made, either by picking or blasting, near to the Pumps, they are levered towards, and let to sink into such new hole: in long lifts and heavy Pumps, this lowest and moveable length of the Pumps is wholly or in part suspended by strong ropes, attached to the large Windlass, which is in all such cases provided near the Shaft for drawing the Pump-rods, or the Pumps themselves, in case of need. As the Shaft is deepened, new lengths of Pump-barrels are added, at the top of the lower lift, and the Pump-rods lengthened, from time to time.

Among other improvements in Pumps and sinking apparatus, Mr. William Jessop, jun. of Butterley Furnace, has introduced a side Pipe, connecting the parts of the working barrel which are above and below the bucket, which Pipe has a stop valve, that the sinker can with the greatest ease regulate, so as to keep the Engine to its full stroke without drawing air, working again on its own water instead: and instead of having the whole weight of the lower lift of Pumps standing on his work, the Sinker has only to lift and deal with the Wind-bore, which slides through a close collar of leather, in a larger barrel above it; and the Wind-bore is besides crooked, and turned aside like a short crank, by which, and the facility with which it turns round in the leathered collar above, the nose of it can easily be removed into every fresh hole, which is made in the bottom by the Sinkers.

In sinking Shafts in Rock or hard Measures, it often happens, that the Sinkers are obliged to work mid-leg deep in water; in such cases, they bore or drill their blast-hole of a proper depth in the bottom; which done, a signal is given to the Engine-tender, or Tenter, above, to work the Engine briskly, to lower the water as much as possible. The Sinker then throws a lump of tempered Clay, about the size of his head, on the place where the hole is bored, pressing it firm all round to the Rock, and into this Clay he sticks a hollow open cone of Plate Iron, 15 or 16 inches high, with the small end downwards, over the blast-hole; the water is then laded out of this cone or funnel, and then the clay is taken from within it, and out of the bore-hole, from which the water is also extracted, and the sides of it somewhat dried, by introducing rolls of soft Paper or Oakum, and in case water springs in at bottom of the hole, it is filled again with stiffly tempered Clay, which is drove very hard into the hole, by a plug of wood which fits it, after which the Clay is scraped out again, and the hole dried: it is then charged with Gunpowder in a tallowed paper cartridge, which is rammed, stopped, and primed by a wire in the usual manner, and its fusee fired: when the Sinkers instantly sling themselves to the drawing-rope, and, on a signal made, are drawn to the top, if the shot be set in a Rock, but if in Bind, though a large charge of Powder is used, they are usually only drawn 10 or 15 yards up the Shaft, to wait the explosion, which sometimes they find themselves not far enough removed from; the lower lengths of the Sinking Pumps are cased with soft rope, to break the force of fragments of Rock which the blast dashes oft against them, and sometimes breaks holes in them, in spite of all precautions which can be used. The sinking of Shafts in such situations is necessarily very slow, and very expensive: I have heard, that the sinking of the new or Wimsey Shaft of Gregory Mine, at Overton in Ashover, in 1790 to 1795, cost 4000*l.* to sink it 266 yards. And that Pits from 7 to 67 yards deep, cost for Labour in sinking, Tools, and Powder, 5*s.* to 67*s.* per yard in depth, at Ballyfield Colliery.

4*th*, *Ginging and Timbering of Shafts.*

During the process of Sinking, which has been shortly treated of above, the Sinkers examine carefully the sides and bottom of their Shaft, to ascertain such beds of hard and compact Rock, Coal, &c. as will stand permanently without lining, and in these parts, the Shaft is carefully made of its proper size, and no larger, while between such beds, it is cut out as much wider all round as to receive the stones, bricks, or timbers and planks, which are necessary to support it, like the lining of a common Well.

In soft or timbering Measures, the sinking is carried down as far as is judged safe, of a larger size than the intended Shaft, when a curb, or flat ring of sound Oak or Elm, is laid on the bottom, on which the stones or bricks are built to the top: the sinking is then begun within this curb, and continued down for two feet or more of that size, after which it is enlarged or bellied out, to the size necessary to receive the Ginging, and thus is continued down, as far as is judged safe, when a new curb is laid, and the steining worked up to the contracted part, which is then cut out on the opposite sides of the Shaft, so as to build up a pier or part of the wall in each, and firmly under-pin it to the curb above: other parts are then cut out between these, and the walling or Ginging built up, and so on, until the whole of the stuff left to support the curb and walls above, is removed, and the Ginging completed.

In some cases, where water comes into a Shaft from a particular Measure, between or above such as are compact and water-tight, a process, called *Stopping-out*, beating-out, or framing-out, is resorted to, for preventing such water from making its way into the Shaft: in ginged Shafts this is effected, by making the Shaft about two feet wider than necessary, building the wall or Ginging very firm, in mortar made of Water-lime, like that of Barrow on Soar (p. 115), and ramming the space behind with well-tempered Clay; carefully joining such Clay to the water-tight Measures, below and above those where water is to be stopped-out, or confined in the measures.

In order to avoid the inconvenience of wet Shafts, and the damage they occasion to the Mine-ropes, &c. spiral channels are often constructed behind the Ginging, called *Garlands*, which intercept the water ouzing from the Measures, and convey it down, either to the bottom of the Shaft, or to some Level, or Pump-cistern, whence it can be discharged or pumped up, without descending to the bottom of the Mine. When water is stopped-out of Mine-shafts, or Gates, by means of close wooden trunks or linings, it is called framed-out, as at Boggard Mine, in Wirksworth, and other places.

5th, *Driving Soughs or Levels.*

Where deep Valleys intersect a Mineral District, it is often found practicable to begin in the Valley, and by driving or cutting a small Tunnel, Sough, or Water-level, and supporting the same with Wood, Stone, or Bricks, to relieve or lay dry the Mineral Veins or Seams of Coal, &c. which lay at considerable depths under the adjoining Hills. Before Steam-engines became common, vast exertions were made in most mining districts, in the driving of long Levels or Soughs, as the only method they had, of clearing their Mines of water: a List of the most considerable *Soughs*, or Water-levels, within the limits of my Map, may perhaps be proper in this place, on account of the Measures which they have explored, and their importance in other respects, viz.

Alabaster Sough, on the W side of Cromford Town, where the water which falls from its mouth in the 1st Lime Rock, turns a Corn Mill.

Attercliff-common, E of the Town, in Yorkshire, $\frac{1}{3}$ *m.*

long, from the Don to Darnall Colliery Engine, now driving, in Coal-measures.

Blackwell, S and E of the Town, 2½ m. long, from Blackwell Pastures to Newton Colliery, E of the Village, drove 50 years or more ago, through various Coal-measures.

Calver, or Ball-eye Sough, SSE of Bonsal, in 2nd Toadstone, 3rd Lime, and 3rd Toadstone.

Cockwell, SSE of Ashover, 1 m. long, from the Amber to Mill-town, in 2nd Grit, 1st Coal, 1st Grit, Shale, 1st Lime, and Toadstone, continued on to Gregory and Overton Mines.

Cow-close, NW of Elton, ¼ m. long from the Brook, in Shale and 1st Lime.

Crich, E of the Town, from Fritchley, 2 m. long, in Shale and 1st Lime.

Cromford, SSW of the Town, to Gang and other Mines, in Wirksworth, 2 m. long, in Shale, 1st Lime and Toadstone, 3rd Lime and Toadstone, and 4th Lime: much warm water: cost 30,000*l.* driving, has now Water-wheels in it.

Ecton, S E of Warslow, in Staffordshire, through the N skirt of the Hill, in Shale Limestone; conveys water to and from the Hydraulic Pumping-engine of the Mine.

Greenwich, E of Ripley, from Padley Hall 1¼ m. long, in Coal-measures.

Hannage, S and under Wirksworth Town, from Mill-houses 1¼ m. long, in Shale, 1st Lime, and 4th Lime, finished about 1740.

Hazle-cross, NW of Kingsley, in Staffordshire, from the Churnet 1¼ m. long, in 1st Coal-shale, 2nd Grit, and 2nd Coal.

High-field, SW of Stoney Middleton, from Combs Dale, in 1st Toadstone and 1st Lime.

Hill-car, almost from Darley to Yolgrave, about 3 *m.* long, passing under Stanton Moor, from the Derwent, in Shale, Shale-stone, and 1st Lime, to Black-shale-pits, Bacon-close, Crash-purse, and other Mines: besides a long branch N, to the Stanton Mines; cost 50,000*l.* driving: Boats were used in it.

Hollinwood-common, E N E of Brimmington, from the Chesterfield Canal, in 10th Coal-shale, 10th Grit, 9th Coal, 9th Grit, and 8th Coal, and great lengths of workings in each: small Boats used in it.

Hubberdale, S E of Taddington, from Deep Dale, in 1st Lime and Toadstone.

Kimberley, in Nottinghamshire, from the Erewash W of Awsworth, 3¼ *m.* long, to near Strelley and Bilborough, through Coal-measures.

Kimberworth, W of Rotherham, in Yorkshire, from Massborough-Holmes to Kimberworth-park, through Coal-measures.

Meerbrook, E N E of Wirksworth, from the Derwent 1½ *m.* long, in 1st Grit, Shale, and 1st Lime, now driving, began in 1773, and has cost more than 45,000*l.* it is said: Boats are used in it.

Moorwood, S of Eyam, from Middleton Dale to Cliff-stile Mine, in 1st Lime.

Snickers, S E of Snitterton in Darley, from the Derwent, in Shale, 1st Lime, and Toadstone.

Stoke, N E of Eyam, from the Derwent at Stoke-Hall, 2 *m.* long, in Shale, 1st Lime, and Toadstone; a Shaft 306 yards deep upon it! it cost 35,000*l.*

Thatch-marsh, W of Buxton, from near Gasling Toll-bar, ¾ *m.* long, through Shale, 1st Grit, and 1st Coal-shale: for Trams to bring out the Coal, now driving.

Tibshelf, S SW of the Town, from the Brook, 1¼ *m.* long, through various Coal-measures.

Trowel-moor, W of Wollaton, from near the SW corner of Wollaton Park, 3 *m.* long, through Red Marl, Gravel, and Coal-measures.

Tupton, N of the Village, from Wingerworth Brook, in 10th Coal-shale, 10th Grit, and 9th Coal.

Wakebridge, NW of Crich, from the Derwent ¾ *m.* long, in Shale and 1st Lime, now driving, to Crich-Cliff Mines.

Water-Groove, N of Wardlow, 1 *m.* long, in 1st Lime.

Wheels Rake, N E of Alport, from the Lathkil, in 1st Lime and 1st Toadstone.

Woodhall-moor, W of Woodhall, in Yorkshire, from Norwood 1½ *m.* long, in Coal-measures.

Woodhouse, NW of the Village, near Totley, in 8th Grit and 9th Coal-shale.

Wright's, NW of Elton, from the Brook near Gratton, in Shale and 1st Lime.

Yate-stoop, N E of Winster, from the Derwent, 2¼ *m.* long (to Portaway Mine), in Shale and 1st Lime, was 21 years in driving, and cost upwards of 30,000*l.*

The above are lasting Monuments, of the spirit and perseverance of the Miners in this district: the Soughs in the Coal districts (which are known by the Measures mentioned in the above List) were mostly, if not all, undertaken by the individual owners or leasees of the Collieries with which they connect: in the Limestone districts the case was otherwise, a company of adventurers or Soughers, in most instances, having begun and carried on these works, in consequence of all the Mine-owners likely to have their Mines relieved by such Sough, agreeing to pay a certain Cope or proportion of all the Lead-Ore, which they may thereafter get by virtue of such Sough: of this I shall have something more to say, when treating of Lead. It may be right however here to mention, that most of these Soughs have proved unprofitable speculations, owing to the tedious time they were in driving, the Miners in the mean time continuing their exertions by pumping and short Soughs, much of the Ore was got before the great Soughs began to act, but more owing to the Mines, particularly in the lower Lime Rocks, growing poorer as they descended, and ceasing entirely to carry Ore in many situations, where the highest expectations were entertained by the Miners and Soughers. The driving of long Soughs, is apt frequently to be interrupted or stopped, by the want of fresh Air, or not being able to carry Wind with them: this, in Soughs and Gates where Boats are not used, is effected by laying a close floor of Boards, and stopping the cracks carefully with Clay, as the Sough proceeds, at a few inches above the stream of water in its bottom; along which *Wind-gate*, or Air-gate, the cold and fresh air flows into the fore-field of the Sough, as the hot and impure air passes the contrary way, near to the roof of the Sough, and escapes. In some instances, Air-trunks or Pipes are supported along the roof of a Sough while driving, and large Bellows are resorted to, to force fresh Air, or Bellows are used, or fire-places constructed, over the Pipe's mouth, to draw foul air out of the Sough; such Pipes however seldom prove effectual in long Soughs, as is now experienced on the Meerbrook Sough, above, but Air-shafts, which will next be mentioned, are forced to be sunk. In driving in the Limestone Shale, Hydrogen Gas, or *Fire-damp*, is often emitted from the cracks in it; in Hill-car and in Stoke Soughs, explosions happened from this cause, and killed several of the Soughers employed.

6*th*, *Air-shafts and Gates.*

When an Air-shaft is become necessary, on a deep Sough or Level which is driving, the utmost care and accuracy is necessary in dialing or latching, to set out the Shafts exactly over the Sough, otherwise, when it becomes necessary to bore down to discharge the water from the Sinkers, great trouble and expense ensues, to find the place of the auger in order to drive to it, which, though its grinding may be distinctly heard in the Sough, the most experienced cannot tell whether it be above, or on which side of the Sough. When an Air-shaft is completed, it often becomes necessary to increase the draught through it, by heat, and such are called *Fire-shafts*, from a large Basket, or Cage of iron-bars, which is suspended by a chain, and after being filled with burning Coals, is let down the Shaft for some distance, this Fire-pan being drawn to the surface, and fresh Coals added, as often as necessary: in other instances, tall cones are erected over Air-shafts, like those over Tile and Pottery Kilns, in order to increase the draught of Air from the Shaft. Mr. Joseph Butler, of Killamarsh Forge, an ingenious Collier and Iron-Master, sinks a small Shaft a short distance from his Air-shaft, usually three feet diameter, and at two yards below the surface, makes a thurl of the same size through into the Air-shaft (which is usually 7½ feet diameter), above which thurl the Air-shaft is close domed over with Bricks: and in this small Shaft, the bottom of which, below the thurl, acts as an Ash-pit, he suspends a cylindrical Fire-pan, or Cage, two feet diameter: by which proportions, he says, that a far greater quantity of Air is drawn from the Pit, than by employing larger or smaller Fire-pans, compared with the Shaft, and particularly so, if compared with the close fire-places and chimneys often employed by Sinkers, and even on some permanent Air-shafts. A Gentleman who gave me much valuable information, when I was on the borders of Lancashire, has since complied with my request, in making a very useful communication to Mr. Tilloch's Philosophical and Geological Magazine (vol. 35, p. 1), the result of his practical experience and observations on Air-shafts, Gates, Damps, &c., to which I beg to refer my Mining Readers; and to solicit of them to make similar communications to the Public, of the results of their experience, in this or other branches of their Art.

Air-gates, or *Wind-ways*, on which much valuable information will be found in the Paper above referred to, are usually formed, either from the open mouth of the Sough or Water-level, or from the bottom of the Pumping-shaft, along the Water-level to the further extent of a Mine; the sides being carefully made up by Boards and close plastering, so as to prevent the lateral escape of the cool fresh Air in the Water-level; and where it is necessary to admit water into the Level, it is done under the edge of a board, or flat stone, which sinks several inches beneath the water, in the manner of a stink-trap. At the further extremity of the work, the Air is let out of the Water-level, and passes through the works, either to some Air or Fire Shaft, or it returns again along the Gate or passage by which the Minerals are conveyed to the Drawing-shaft, up which it escapes by its levity, from being heated, and in some instances mixed also with Hydrogen in small quantities.

7th, *Damps, or Foul Air.*

Mines and Shafts are subject to two kinds of foul or noxious air, the one a heavy invisible Gas, chiefly composed of Carbonic Acid, which settles in the bottoms of Shafts and of the Gates of a Mine, where there is a want of circulation, and proves fatal to animal life by suffocation, or for want of the Oxigen which is essential to respiration, and to the burning of Candles or fire, to which Oxigen is alike essential; this is called the *Choak-damp*, black-damp, sweet-damp, Styth, &c. and animals affected by it are said to be damped, stifled, &c. It has been remarked by some Colliers, whose Pits are subject to accumulations of this gas, that Horses will exist two days, in places where Men would almost instantly fall, and that Asses will often survive Horses two days, when it has been found impracticable to ventilate the Pits affected by Choak-damp, in less time.

The other kind of Damp is also an invisible Gas, chiefly composed of Hydrogen, which often issues in streams from the cracks and joints in Coal and Shale strata, &c. and by its lightness, occupies the tops of the Gates and hollows, and where, without great care, it will accumulate, and by being mixed with atmospheric air is liable to explode, and not only burn the Miners, but commit horrible devastation, when the quantity is considerable; it is called *Fire-damp*, Wild-fire, &c.

In driving headings and thurls, the small quantities of Hydrogen constantly emitted by the Strata, accumulate in time, particularly if the work be left, and explode on the Candle's approaching, or being accidentally lifted near to the roof. Mr. Butler, mentioned above, in such situations, lays a slight tram-road along the bottom of the heading, and keeps a pulley fixed in or near the forefield, over which a rope passes, so that when the accumulation of damp is suspected on the Men's return to work, the tram can be drawn into the further end of the thurl, carrying a lighted Candle to explode the gas; the Men at the time retiring into ventilated places, out of the direct passage from the thurl to the Shaft, and taking care previously to open the doors, and clear the Gates and Shafts of all impediments. Bunches of Gorse or Furze, disposed like a fan on the tram, so as to fill or sweep every part of the thurl, drawn briskly in and out of it, is also found very effectual, in breaking and dispersing the stagnant damp, of either kind: a similar fan of Gorse, let fall into new Shafts which have damp in them, and drawn rapidly up again several times, has also great effect in dispersing it, and changing the air, which is the thing wanted. The Fire-damp comes out of the newly opened joints in the Gates and workings, and seldom out of old Hollows; while the black or Choak damp most prevails in old Hollows, and works which have stood still. Some Miners conceive, that cloudy and damp Weather increases damps in their Mines, and that the budding of Trees, but more especially the flowering of Pease, are seasons when damp in Mines is more prevalent than others. I heard of explosions having happened, in Amos-cross Mine, Beggarlee, Boythorp, Codnor nether-park, and Donisthorpe Collieries, Little Pasture Mine, Midhope-stones, Pentrich, and Somercotes-furnace Collieries, at Wingerworth Colliery in 1675 (Phil. Trans. No. 119), &c. See Mr. John Taylor's simple Ventilator for Mines, in the Transactions of the Society of Arts, vol. 28, p. 219.

8*th*, *Steam-Engines*, *Wimseys*, *Gins*, *&c.*

In the early periods of Mining, a series of inclined wooden Pumps, each of which was worked by a Man, who sat and pulled up the bucket by means of a cross-handle, were in use, called *Churn Pumps*, and also series of common Chain or *Rag Pumps*, worked by a great number of Men in succession, in order to lift the water out of the bottoms of the Mines; the last of which, were once used on a great scale in Yate-stoop Mine. Rag Pumps were also used for Collieries, in some places, and still are so at Whittington-moor. At Good-luck (Burdet's) Mine, N E of Wirksworth, the Horse-Gin was furnished with a cog-wheel, pinion, and cranks, to work Pumps, but is now disused. Windmills were on some occasions erected to work the water out of Mines, of which remains are still visible NW of Monyash, and at the Dimple Mine, in Matlock. Water-wheels working Pumps by means of Cranks, and hence called Cranks, were more common; at present, Baslow Colliery, Dimsdale, and Stanton-Park Lime-Quarries and Mines, the Gang Mine (where they have two Water-wheels under ground on Cromford Sough), Shallcross Colliery, and Ticknall Lime-Quarries, are the only places where I saw such machines now in use, so generally have Steam-Engines been adopted, wherever great power or exertions are wanted. The Lead-Miners of Derbyshire, early availed themselves of this powerful auxiliary: at Yate-stoop the first one was erected, and where, about 80 years ago, four Steam-Engines were working at one time, previous to the erection of a 50 inch Atmospheric Engine (about 30 years ago) on the Level under-ground, a method which has not elsewhere been followed in this district. In a few years after their introduction, 10 Steam-Engines were erected in the immediate neighbourhood of Winster. The Mine Engines at any time used in the district were, at Dale and Haybrook-gate Mine, in Warslow, Staffordshire, Dimple, Gregory 2, Lady-gate, Lime-kilns and Drake, Mill-close, Mullet-hill, Placket 2, Portaway Pipe 2, Seven-Rakes, Water-Groove, Westedge, and Yate-stoop 5. In 1810, the only Lead-Mine Pumping-Engine going in the district, was the newly erected one on Lady-gate Vein, at Matlock Bridge. Great numbers of the larger Collieries have now Pumping Steam-Engines, some of which are of great power. Within a few years past, a new use of Steam-Engines has been made, by applying them to the winding or drawing up Coals and Minerals; these small Steam Winding-engines are called *Wimseys*, the first of which, in these districts, was erected at Oakthorpe Colliery, in Measham, in 1790, as I am informed: they are now so common at the larger Collieries, some of which have three and even four in their field, that I have noticed more than 50 of these Wimseys in Derbyshire and Nottinghamshire. The cost of these, complete, for drawing at one Pit, may be about 500*l*. each, and they will raise 5 to 12 cwt. of Coals at a time: large Steam-Engines for Mines, cost 2000*l*. or more, and consume 20 to 24 Tons of Coals per week. I met with no Pumping Engine on Bolton and Watt's principle, at a Coal-Pit; the old Atmospheric Engines, well contrived and executed, being thought to answer better in such situations. Large Buckets of water descending on an inclined plane, are made to draw Coals at Brinsley New Colliery, Notts, and large Buckets fixed on the ends of Beams, are applied to work Pumps, in Ecton Mine, in Staffordshire; the *Water-Pressure* Engines* at Crash-purse and Bacon-close Mines, in Yolgrave, also, are worthy of notice, and so are the improved drawing apparatuses, applied to the Wimseys at Adelphi Furnace, and at High-hazles Colliery, in Yorkshire.

Horse-Gins have been already mentioned, as used in sinking Shafts, which also is the most common mode of drawing Coals at the Collieries, and Ore at the Mines, except the smaller concerns, where Turn-beams and Stowses worked by men, are alone used.

It may be of some use here to mention, that in 1803 an action was tried at Derby, between the owner of an Estate at Harts-hay, near Pentrich, and the owner of Coal under it, which had been assigned away from the Estate at a former period, with powers for getting or working *in the usual way:* and the Coal-owner having then lately erected Wimseys for drawing his Coal, and the latter case, nothing further can be done until a second Shaft is sunk, often called the Bye-pit, and connected by a thurl or heading with the Pumping-shaft, when a stream of air will generally begin to circulate, down the water or Pumping-shaft and up the Bye-pit; but if this does not happen, the Bye-pit must have a fire-pan suspended in it, in order to increase the draught, or be treated as a Fire-shaft, (page 333); in case of foul air still remaining at the bottom of the Shafts and in the thurl, if the Pumps be made to scatter a part of their water down the Shaft from the top, in as extended a sheet as possible, it generally will succeed in expelling such air. Having thus procured a stream of pure air at the bottom of the Pumping-shaft, or in the Sough where it foots the Coal, with a communication thence to a Drawing or Working Shaft: the next operation is, to drive the Water-levels in the Coal, that is, to cut a Gate or passage each way, so that the water will stand in its bottom, having the least perceptible fall each way towards the Pumping-shaft or Sough: if the Measures are regular, and no Faults occur, this Level will be straight, whatever degree of dip the Coal may have. It does not often happen, that the Water-level can be driven far, for want of air, without carrying on at the same time, a parallel counter-head, counter-level, or Gate, at three to six or eight yards from it, up the slope of the Coal, and driving bolt-holes or small thurls between them, as often as necessary, and carefully stopping up all those previously made; by which means, a stream of air will constantly flow along the Level, from the Pumping-shaft (or its own natural outfall), and return along the counter-head to the Bye-pit or Drawing-shaft, as mentioned page 334. In deep Pits, or in expensive ground to sink, it is not unusual to make the Engine-shaft large or oval, and to divide it by a close partition of boards from top to bottom, by which means, one half can be appropriated to pumping, and the descending current of air; and the other half to drawing Coals, &c. and the ascent of the heated and foul air, instead of sinking a Bye-pit: and in the night, or when Coals are not drawing, a fire-pan or a close cover instead of a Dome (see page 333), may convert such half of a Pit into a Fire-shaft, for more effectually ventilating the Works for the next day.

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* These important Engines (from the great quantity of water which they raise) were erected by Mr. R. Trevethick, the former about the year 1805, and are, I expect, on a similar construction to that which he erected at Druid Copper Mine, in Cornwall, of which an engraving and description will be found in W. Nicholson's British Encyclopædia, art. ENGINE. When I was at Crash-purse Mine, I saw only the Beam of this Engine, which is above-ground, and was less particular in my enquiries concerning it, or desire to see the whole of it, from having been referred to one of the Proprietors a few Miles off, who has the drawings of it, and every particular of its construction and operation; but unfortunately, I did not find that Gentleman at home.

Thus far, are operations common to most Collieries: it now becomes necessary to ascertain, from the hardness, toughness, and durability of the Roof, or Strata which immediately cover the Coal, what width of openings can be made without the Roof quickly falling into them; and sometimes it unfortunately happens, in Coals of moderate thickness, that the Roof is so tender and bad, that some part, and often the best shead or bed of the Coal, must be left for a Roof: while in other cases, and thinner Coals, the badness of the Roof prevents entirely their being got. Besides the lengths of the Banks, or works which can be opened at one time, it now becomes necessary to consider, what direction such Banks or faces of the work must have, with respect to the Water-level and its parallel Counter-level, or working-gate, as hereafter we may call this passage; which must be regulated by the Slines, or lengthway joints of the Coal, which, as observed page 181, generally in these districts range from ESE to WNW, or nearly so, since without the face of the work conforms to this direction, the expenses of getting will be much increased, as well as the Coals broken small, and much damaged in the operation.

In Derbyshire and its environs, Coal-seams having a pretty sound Roof, and their Water-level ranging nearly parallel with the Slines, are now generally worked the *long way*, as it is called, or with long Banks, which is the most economical method, where it is practical, both in the expenses of working and in the produce of Coal. In this case, a cross gate or thurl is begun from the working-gate, at 50 yards or more from the Engine Shaft, which is driven 10, 15, or 20 yards up the slope, or greatest rise of the Coal; but oftener two such cross, or Jenny-gates, as they are sometimes called, are driven at three or four yards asunder, both for conveying air, and for furnishing a double way to the Banks: other gates are then driven in the Coal branching from the Jenny-gate, opposite each other, and ranging parallel to the working-gates, the side of which gates next the working-gate is called the counter-end, and the others the Bank or face of the work, the length of which varies from 5 or 6 to 80 or 100 yards in length, according to the goodness of the Roof, and the parallelism of the Slines to the Level.

The working now commences, by a set of Colliers called Holers, who begin in the night, and hole or undermine all the bank or face of the Coal, by a channel or nick from 20 to 30 inches back, and 4 to 6 inches high in front, pecking out the holeing-stuff with a light and sharp tool called a pick, hack, or maundrel: and placing short struts of wood in such places where the Coal seems likely to fall, in consequence of being so undermined. On the facility for this holeing, much of the profit of a seam of Coal depends, as well as on its roof: in favourable cases, a thin stratum of sloam, spavin or soft earth, or of soft and bad Coal, lies under the valuable seam, in which the holeing can be made, and a hard rock or bind covers the Coal, so that the whole of it can be got: in less favourable cases, the holeing is obliged to be made in the middle of the seam of Coal, where there happens to be a soft bat of earth or bad Coal, when the labour of wedging up the lower part and the breakage of the whole, is much increased; and in the worst cases, the holeing is forced to be made in good Coal, chipping and wasting it, and at the same time, some of the best Coal is obliged to be left for a roof to punch to, an operation which will shortly be mentioned.

When the Holers have finished their operations, through the whole length of the Bank, or Banks, and cut a vertical nick at one or each end of the Bank, called the cutting-end, and have retired, a new set of Men called Hammer-men, or Drivers, enter the works, and fall the Coal, by means of long and sharp iron wedges, set into the face of the Coal at top or near it, according to circumstances, which they drive by large Hammers, till the Coal is forced down, and falls in large blocks, often many yards in length: this being a very dangerous part of the operation in the first bank, and before there is room, as afterwards, to step back between the puncheons, when the Coals fall: a man called the Rembler next follows, and with a hammer-pick breaks the blocks of Coal into sizeable pieces: and the drawing apparatus being ready, the loaders fill the Coals into the Corves or Trams, which the Corve-men who drive the Horses, Mules, or Asses used in large works, or the Hurriers or those who drag the Corves, in smaller works, convey them to the bottom of the Drawing-shaft; where the Bottomer, Bridger, or Hooker-on fastens the same to the tackling-chains, and the Corve is drawn to the top, by the Wimsey, Horse-gin, or Turn-beam, employed for such purpose: here the Banksman or Striker, by means of a bank-hook, draws the Corve from over the Pit and lands it; but now frequently, sliding stages move on to the top of the Shaft, to receive the Corve, instead of thus dragging it on to the landing-stage or sattle-board. The Corves are next dragged to the Pit-Hill to be stacked or loaded into the Carriages of purchasers, or into Trams for the Railway, which is laid for conveying away the Coals; in some instances, however, the Tram-Corves themselves are adapted, to pass on the Rail-way. Where only very large Coals are drawn, in the wasteful practice alluded to (page 185), a mere sledge, formed of four pieces of wood, is substituted for a Corve, and even the huge blocks of Coal are drawn, by only slinging them in the chains: more commonly, the Corve is a square shallow wooden Box, having a fixed iron bail or handle over it, in smaller works, and being slung by four chains hooked to the corners, or double chains looped under the ends, in larger works. In some places, it is said, that the Corve, level full, ought to contain nine pecks, and in others to contain 2 cwt. or 240 lbs. but this, as before observed, is seldom the case, or that any thing but the convenience of the Colliers, limits the size of the Corves they employ. At Ponds Colliery, in Sheffield, Yorkshire, large Basket Corves, in shape of the middle zones of a Globe almost, are used; and at Bakestone-dale and other Collieries near Pot-Shrigley, Cheshire, very shallow cylindrical Basket Corves are used. In order to heap the large Coals on to the Corves, instead of increasing their diameter or size, which would be inconvenient when they pass in the Pit, square light frames of wood called *garlands* are used, sometimes two or three at a time, to hold on the Coals: in some places, circular hoops of plate iron are used for Corve-garlands.

We will now return to the Pit, from whence I suppose all the Coals which had been fallen from the Bank, as above, to be turned or drawn up, and the day's work to be completed. A new set of Men now enter the Pit, called Punchers or Timberers, taking with them a number of stout posts of wood, cut or sawed off to a certain length, from very old Underwood or the thinnings of Plantations, or the straight arms of trees. These puncheons they set up in a row, in front of and almost touching the new face of the Coal, applying a small flat piece of wood, or templet, at top of each, unless the roof, which they punch-to, as it is called, be very hard: the distance of these puncheons differs according to the goodness of the roof, being sometimes necessary at less than a yard apart, and at others they are necessary only here and there for precaution, where joints appear in the Rock above; or they are wholly omitted, as in Shipley and Apperkrowl Common Collieries, and others. The work is now ready for the Holers to return, and after another day's work as above described, the Punchers return, and in pretty good roofs they take down the puncheons in succession, and remove them forwards almost to the face of the Coal, as before; or otherwise, they set up a new row of punches, observing to place these opposite the openings of the former row, and on the second, or even sometimes the third day, they take down the back row of punches, except any which may have taken so great a weight as to be broken, or to be incapable of removal by cutting out the floor or the roof, or both, round them, and remove them to the face of the work. The number of these large posts of wood which are broken, worn out, or unavoidably left in a Coal-Pit, particularly for supporting its Gates or passages, forms often, no inconsiderable part of the expenses of the work: this occasioned the invention of Cast-iron Puncheons, or Stauncheons and caps, by Mr. John Charlton, a most ingenious Mechanic and Coal-Agent, who has a Patent for them, dated 10th April, 1802; they are used at the Adelphi and other Collieries, being fluted and braced so as to have great strength and lightness. Where the weight is apt to come suddenly on the Puncheons, such are not used, but what are called Packs, of square logs or Nogs of wood, are piled up, in place of them: these will bear very great weights, and are easily removed, when placed on an inch or two thick of holeing-stuff, or on a soft floor, which can be picked out from under them. These Packs of nogs of wood, or of flat stones, are often necessary by the sides of the Gates, particularly such as have long been driven: in Donisthorpe and some other deep Collieries, the main Gates are obliged to be supported by brettices or packs of Puncheon-wood, four feet long, laid close to each other, crossing each course, up to the roof.

In some of the Derbyshire Coal-measures, a thin stratum is found near the top of a Coal, of greyish Earth, called Duns, Cat-dirt, Tow or Tawe, which, though on analysis by Mr. David Mushet, seemed to consist only of infusible Clay and Bitumen, has the singular and mischievous property of heating and actually taking fire, some time after it is exposed to the air: at Heanor, Ripley, Denby-hall, and other places, this substance is now carefully separated from the holeing-stuff and refuse of the Pit, and brought to the surface, instead of being thrown into the Gobbins or Waste behind the Puncheons, as was done some time ago at

Derby-hall, I was told, and occasioned the fireing of the Pit, so that nothing could extinguish it, but ceasing Pumping, until the works were drowned with water. At Donisthorpe, where the Tow is thrown into their Gobbins, the expense is incurred, of making brettices, and plastering them thickly with tempered Clay to exclude the air, which otherwise would in time fire the waste Coals in the Gobbins, and by its smoak and heat drive out the Colliers, and at length fire the Pit; as happens constantly near Dudley, in Staffordshire, unless a perfect rib of Coal is left round each chamber or working, so as to exclude for ever, when the entrances are stopped up, the access of fresh Air. This expensive and most wasteful practice might, I firmly believe, be prevented, by discovering the Duns or Strata which thus spontaneously burn (for they have no Pyrites I understand), and carefully drawing the whole of them to the surface, instead of letting them mix with a heap of small and middling-sized Coal or Sleck, six or seven yards thick on the bottom of their works, which are thus wasted, and for ever buried and lost! along with the Ribs of valuable Coal which surround them. I know that here it is a general opinion, that the small Coals themselves take fire*, within two years after they are exposed to the Air; but this has never been proved, and analogy seems to offer nothing in support of such an opinion: by a separate experiment on the produce of each stratum that is disturbed in their workings, the fireing matter in the Dudley Coals, might certainly be detected, and this knowledge might prove of the greatest importance to the Land and Coal Owners, and to the Public also.

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* The late Mr. Williams mentions two instances of Coal heaps taking Fire, in Scotland, and attributes the same to Pyrites blended in the Coal, see his "Mineral Kingdom," 2nd Edit. II. 32.

Sometimes the Jenny-gates, described above (p. 344), are driven at once up to the old workings by former Levels, or to the extent of the ground or intended working, and but one Bank is made extending both ways, by which means, under favourable circumstances, the whole of the Coal is brought back before them, and none left in Ribs or Pillars, except near the permanent Gates, Levels, and the Shafts: in other cases, the wide Ribs and Pillars at first left, are robbed, as it is called, of as much of their substance as the Colliers dare, for fear of their lives by the falling of the roof, before these parts of the works are entirely abandoned, and become old-hollows.

When there is a considerable inclination of the Slines or natural Joints of the Coal to the Level and working gates, the lowest end of the Slines or face is called the deep or dip *end*, and the other the rise *end*, those being perpendicular to the rise board, and they introduce variations in the mode of working, which can be readily conceived by those who thoroughly understand the above, but would require Plates and a long description here, to make them intelligible. I shall therefore pass on to the other mode, viz.

Working by *Post and Stall*, or by very short Banks, a method which is, I fear, often resorted to, and great quantities of Coals wasted, where the long Banks above described might be used, with proper care and precautions: since it seems to require a much stronger roof to support the large square or long chambers, or stalls, which are in some places made, than for the temporary Banks and Gates of the long-way of working; in which often, the whole of the Strata above, bend down after the work, and settle firmly and quickly on the Wastes, in the manner most favourable for the getting of other Seams, above or below, and free from the unsightly and expensive holes to drain on the surface, which often disfigure the Lands, where Coals have been worked by Post and Stall. In Derbyshire, the laudable exertions of the Farmers have been such, in levelling the Pit-hills, and effectually limeing the surface as soon as the Colliers retire, that the damage seems but temporary which they occasion by their works; while often, the dread of their coming deters the Farmer from draining and all other improvements of his Lands, as may be seen at Riddings, in Alfreton, and in numerous other districts containing Coal and Ironstone, the property in which has been injudiciously separated from the Land. At Eckington Colliery, Adelphi, and other places, I witnessed very effectual precautions to preserve the top-soil, and to level and spread it again on the Land, as the works proceeded: by which, the subsequent operations of the Farmer were facilitated, and his Land, ultimately, rather improved than injured by the works of the Collier. Mr. Joseph Butler, who has before been mentioned, takes the precaution of opening all the Ditches annually, and of water-furrowing and draining in some instances, particularly round the old workings of Iron-stone Rakes or Basset-Coals, on all the Lands which are likely to affect his Norbrigs and Lings Collieries, by retaining the water of heavy rains, to soak afterwards into his works below: a practice which ought to be more followed by Coal-masters, and to which, slovenly or unneighbourly occupiers of the soil, ought, perhaps, not to possess the right of opposing obstructions or denial, to so useful a precaution to all parties.

The method of Post and Stall is now but very little used in Derbyshire, or near it, I believe; but the tenderness of the roofs occasion very short Banks to be used at Boythorp, Lounsley-green, and various other Collieries.

Thin seams of *Cannel*, Branch, or Sparkle Coal, are found at Blackwell, Calow, Henmore, Knoll, in Lancashire, Skegby, Notts, Somercotes-furnace, Tibshelf, Ticknall, Woodthorp, &c.

Peacock Coal, or irridescent, is found in Car-lane and Score-wood Collieries, near Aston-under-line, Lancashire. See List of Collieries, page 188.

2. *Copper.*

The quantities of Copper Ore which Derbyshire produces, is very small. Cumberland Mine, at Matlock Bath, has, as I am told, produced a few specimens: and the late Mr. Gell, as I am informed, procured some Tons from his Nursery Mine in Hopton, which is, I suppose, the place, whence the specimens in the celebrated Woodwardian Collection at Cambridge were got, which are described (Dr. Woodward's Catalogue, I. page 194 and 5) as from near Wirksworth: the other specimens there mentioned as from near Ashburne, came perhaps, from the Hill called Atlow Win, which I have already mentioned, page 230, as probably containing Metallic Ores. Mr. Pilkington, in his "View of Derbyshire," vol. I. p. 186, mentions lumps of Copper Ore being found in the vegetable soil at Bonsal, and in Matlock; and I saw in the possession of Mr. Cornelius Flint, of Hartington, a large lump which the late Thomas Woodhouse ploughed up, on the 4th Limestone Hills, 1 *m*. N of Hartington: the three last seem to have been accidental alluvial bolders, belonging to regions far removed from Derbyshire; of which we find other instances in the Bloodstones, or alluvial Ores of Iron, found in several places, as will be mentioned further on. Mr. Pilkington mentions a pretended discovery, by ignorant or designing persons, of a Copper Mine at Rushop Edge, near Peak Forest (in Limestone Shale); and I heard stories of a similar *discovery*, in Great-Rocks Dale, near Tunstead, in Toadstone.

Near to this County is the famous Ecton Mine, in Warslow, in Staffordshire, whence most immense quantities of Copper Ore have been extracted: before 1770, this Ore was smelted at Denby, in Derbyshire, on account of the Coal there, being supposed to be particularly proper for the purpose; at which time works were first erected at Whiston in Kingsley, in Staffordshire, and much enlarged in 1780, for smelting and refining the Ecton Ore, with Coals from Hazles-cross, in Kingsley; the Duke of Devonshire, the owner of Ecton Mine, having purchased the Hazles-cross Estate, &c. on purpose, as I have been informed. The Duke's Copper has mostly been sold to the Brass Company at Brook Houses, near Cheadle*; but I believe the Ecton Ore was never smelted there, as Mr. Mawe states, page 112 of his "Mineralogy of Derbyshire." The body of Copper Ore seems now nearly or quite exhausted in Ecton Mine, but the thick skirts to the Vein, and numerous scrins and small Veins, or strings, branching therefrom, which the Miners neglected to follow when the Copper Ore was in such plenty, still produce considerable quantities of Lead Ore, which is smelted at Ecton, and about Ore enough to produce a Ton of Copper weekly at Whiston; where, about 1781, 12 Tons of refined Copper were produced weekly from this Mine. In Upper Elkstone, there are Hill-house, Riletch, and Mixon Mines, and one between Waterfall and Grindon, I believe, which have produced some Copper, as also Ribden Mine near Caldon, Dale in Warslow, and a Mine near the Wire-Mill, in Alveton; where Copper and Brass Wire is drawn, and at Oakmoor Mills, Copper is cast, rolled, and slit, &c. At Alderley-edge, in Cheshire, Copper Ore is found, and at Mottram St. Andrews; see Mr. Holland's Report, page 16: and lastly, at Broomhead-Mill, near Bolterstones, in Yorkshire, some Copper Ore is found, as I am informed, having never visited the spot. See the List of Mines, page 252.

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* At Sheffield there are other Brass-works, where the Calamine of Derbyshire is used in making Brass. At Ashburne, Mr. Frith has a Brass Foundery.

3. *Lead.*

The Lead-Mines of Derbyshire are very numerous, as observed in the introduction to the last Section, p. 243, and generally produce Galena, Sulphuret of Lead, or blue Lead Ore crystallized in Cubes; but square and hexagonal pyramids, and other forms of Lead Ore sometimes occur [*].

Within

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[*] Lead Ore, with reference either to its size, purity, structure, or kind, bears the Names of Belland, Bing, Blue, Fell, Galena, Glance, Goods, Green, Hillock, Lead-glance, Leaf, Peasy, Pippin, Potters, Scrogs, Smitham, Steel-grained, Tag'd, Toots, White, Wicks, Yellow, &c.

A late Writer, Dr. Millar, of Edinburgh, in his 2nd Edition of Williams's "Mineral Kingdom," vol. II. p. 442 and 448, mentions *Slicken-side*, seeing-glass, or looking-glass Ore, as a Variety of *Galena*, found in

Derby-

Within a few years past, the Miners of Derbyshire have discovered a White Lead Ore, which was previously taken for a useless Spar, and was either left in the Mines, or buried in the old Hillocks, from which very considerable quantities of White Ore have since been extracted; it is a Carbonate of Lead, and is often called Wheat-stone. Certain Mines have been found to produce this *White Ore*, in the following places, viz.

Brassington,
Calver,
Flagg,
Great Hucklow,
Great Longsdon,
Hartington,
Hassop,
Monyash,
Sheldon,
Tideswell,
Wensley,
Winster,
Wirksworth;

as will be seen in the general List of Mines, and their principal and more curious products, page 252. As also the Mines which produce a *Green Ore* of Lead, in Brassington, Great Hucklow, Tideswell, and Winster.

The *Yellow Ores* of Lead, which Mr. Mawe mentions, pages 105 and 107 of his "Mineralogy of Derbyshire," are rather rare occurrences in Derbyshire, I

Derbyshire, and in Durham County; and in which it seems probable to me, that he confounds the fracture of Leaf or Glance Ore, with the mechanical polish on Slickenside faces, for the sides of such fissures seem lined or coated with common Galena, upon the Barytes, Fluor, or Calcareous Spar (whichever the Vein-stuff happens to be), and not invariably on a Compound of these three; which mixture is not understood by the term *Cawk*, in Derbyshire, as Dr. Millar seems to state, p. 449 and 472, and Mr. Robert Bakewell, a late Writer, in the Monthly Magazine, vol. 31, page 8; but such term is applied to the Sulphate of Barytes, Terra-ponderosa, or Heavy Spar alone.

believe; as are also the varieties which the late Mr. Greville purchased at a shop in Matlock, about the year 1785 (Nicholson's 4to. Journal, IV. p. 221), and which Mr. Sowerby has recently represented in his "British Mineralogy," Tab. 399.

In the introductory part of this Section, when speaking of the discovery of Mines, as well as on a former occasion, I have alluded to certain ancient Customs (pages 314 and 251) prevailing in the Mineral parts of Derbyshire; these are called,

The Mineral Laws.

Which apply to the King's Field, or Hundreds of High Peak, and Wirksworth Wapentake or the Low Peak, with the exception of Griffe Liberty, near Hopton, some Estates near Eyam, &c. and extend also to the Mines in Crich, with some modifications, as I have been informed, although situate in Morleston Hundred. Recently, however, it has been contended, that the Mining Rights in the High and Low Peak, are confined to such Lands and Manors as belonged to the Duke of Lancaster, and that these Laws have no Legal application to Estates which never made part of the Duchy of Lancaster; and this question is expected shortly to be decided, by a Legal process which has been commenced by Mr. Adam Wolley, of Matlock Bath, against the Dimple Mine Company, for entering on a Field of his near Matlock Bridge, and digging, &c. in search of a Vein of Lead Ore.

These Laws or Customs, which are very ancient, seem originally to have authorised any Man, or set of Men, to enter at any time on any part of this King's Field, comprising the greater part of the Mountain

Limestone district of Derbyshire, to dig and search for Veins of Ore, without being liable or accountable to the Owners or Occupiers of the Soil, for any damage which they did to the surface, or even to growing Crops. At present, however, it is held, that unless a Miner procures Ore enough, from any search he may make after a Vein, to *free* the same, that is, to pay to the King, or his Farmer or Leasee, a dish of Ore, he is liable to the Occupier for all damage he may have done him : and fortunately for the Farmers of the present day, the searches were so repeated and universal in former times, under the sanction of these Laws, as observed page 314, that no one now thinks of digging or delving on the Limestone surface as formerly, in search of new Veins of Ore, although the Agriculturist is most materially annoyed by their operation in another way, which I shall mention further on.

In the King's Field, there are several Officers appointed, called *Bar-Masters*, and Mineral Courts held, at which a Jury of 24 Miners, decide all questions respecting the duties or Cope payable to the King or his Farmer, and to the working of the Mines, by those to whom the Bar-Master has given Possession, and even decide on, and enforce the payment of, Debts incurred in the working of the Mines, in certain cases. These Laws or Customs were printed at London in 16mo., in 1688, under the title of the "Complete Miner;" in 1734 they were reprinted in 8vo., with additions by George Steer; and again, in 1772, by William Hardy, &c. These Laws bear evident marks of having originated in the very infancy of Mining, and were adapted to the working of the Mines entirely by manual Labour.

A person having found a Vein of Ore, made certain crosses on the Ground, as a mark of temporary possession, and then went and informed the Bar-Master, who attended, and received a measure or dish of Ore, the first produce of the Mine, as the condition of permitting him to proceed in working his *Meer*, or measure of 29 yards in length of the Vein: the Bar-Master, at the same time, taking possession of the next adjoining 14½ yards, or half Meer of the Vein, for the King. And if the Vein seemed promising, it often happened, that at the same time, or soon after, there were various applicants to be admitted each to free his Meer, or 29 yards in length of the Rake Vein in succession. It was a condition, that each person or company possessing their Meer or Meers in partnership, called Groove-fellows, should immediately begin and continue to work at their Mine, as in case of intermission for three successive Weeks, the Bar-Master was authorised to dispossess them, and give the Mine to another.

As these first Mines, were all in the districts where the Limestone has no other cover but the Corn-soil, each Miner went to work, and with Mattocks or Picks, and with Hammers and Iron Wedges in the harder Veins, loosened the Ore and Spar, and threw out the latter into a bank or ridge of their Vestry or Bowse, on each side of the Vein: proceeding thus to sink and throw out the Vein-stuff, as deep as was practicable; when a square frame, composed of four narrow planks of Wood, laid across, and pinned together at the corners, on which two others were erected, with holes or notches to receive the spindles of a turn-tree, or rope-barrel, for winding up the Ore in small tubs; this apparatus, called a *Stowse*, being erected on each Meer or Mine, the sinking was further continued, and the heaps on the sides of these *open-works*, or open-casts*, increased, until in numerous instances a perpendicular ditch of the width of the Vein, and many yards deep, was opened, with proportionally large heaps of rubbish on each side, for many hundred yards in length, with other similar Veins and heaps parallel to, and crossing them at certain angles. Great numbers of the Mines thus opened, proved too poor in their produce of Ore, to be sunk lower than Men could throw out the stuff, before the Miners abandoned them, and others, after some progress had been made in deepening them by means of Stowses. But as in after times, other adventurers might appear, who would resume the work, the strictest Laws were made and enforced by the Mineral Courts, for preventing the Occupiers of the Soil, or any other persons, from meddling with the dangerous ditches, or throwing in the unsightly heaps of barren white Spar and rubbish, which the Miners had left on the land. Some of which shallow Mines, opened apparently in the very earliest periods of Mining in Derbyshire, still remain, and until within a few years past, most, if not all, of the Veins which had been tried to a few yards depth and abandoned, remained in this state, or altered only by the treading of Cattle, and natural mouldering of the sides, except where Roads, and the Fence-walls dividing properties, crossed them. As the Mines which proved richer in Ore increased in depth, instead of continuing to draw all the Vein-stuff to the surface, the Miners constructed floors or stages of Wood across the Mine, called Bunnings, just above their heads, and on to these threw the refuse, or Vestry, for the whole length of their Mines, which thus became covered over, except just under the Stowses, or drawing apparatus, at which place they sunk six or eight feet or more lower, and after clearing some distance, began other Bunnings under the former, on to which the refuse was thrown, as before: and as the work thus proceeded, the Shaft under the Stowse was either lined with timber or stone, called Ginging it, and the Vein-stuff which was drawn, being thrown on to the Bunnings on each side, a regular hill was at length formed, and increased round such Shaft, and is called the Mine-hillock or Hillock.

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* Similar modes of opening and working Lead Veins, have recently been practised in the Island of Islay, in Scotland. See Williams's Mineral Kingdom, 2nd Edit. I. p. 275.

In process of time, as the Mines increased in depth, and having reached to Water in the strata, the drawing of such in Barrels, and the Ore and Vein-stuff which could not be stowed on the Bunnings, so increased the labour and expense, that many valuable Mines were abandoned on that account, until *Horse-Gins* were erected for drawing the Ore and Water, and *Soughs* began to be driven for draining off the Water, as explained page 328, and the Mines or Meers of ground became consolidated, or the property of them united; and the Mines being connected below, the Ore and Vein-stuff was carried to particular Shafts to be drawn, and on the Hillocks of which, *Coes*, or small buildings, were in time erected, for stowing the Ore, Tools, &c. and sheds for the accommodation of the Ore-dressers, or those who separated the smaller portions of Ore from the Vein-stuff, a process which was probably little attended to in the earlier periods of these Mines.

The Mining Laws, which, previous to this time, had required a working *Stowse*, and its actual use, at least once in three weeks, in drawing Ore on each Meer of ground, became now relaxed, so far as to allow models of Stowses, or small *sham* drawing apparatus, made of thin laths of wood, which the Bar-Master provided, to be used as the means of keeping possession of all the Meers but one, on a consolidated Mine: a custom which prevails to the present day, and is so rigidly enforced, that a Mine on which large Steam-Engines and powerful Horse-Gins, and other expensive apparatus, may have long been used, is not held to be legally occupied, unless one of these pigmy memorials of the primitive mode of drawing Ore, is constantly kept "in sight of all Men," as the Laws express it, on or within a certain distance of the Drawing-shaft (where a Stowse worked by Men is not used), and others on each of the Meers of ground, or lengths of 29 yards, of which the Mine consists.

The Laws of the King's Field punish by Fines, all such Persons as are detected in removing or destroying the Bar-Master's Stowses, though placed across the middle of a cultivated Field, a Common, or on the Fence-wall next a public Road, as is very commonly the case: but the noble Horse and the sturdy Ox, disregarding such puny representatives of property and authority, continually tread them to pieces, while Travellers and Strangers, the Servants of Gentlemen who are travelling, in particular, as commonly bear them off from the Roads, as curious memorials of the folly or superstition of the Inhabitants. The Bar-Master furnishes such Models, which to be effective must have no nails used in their structure, but be pinned together with wood, according to the state of actual Stowses, when these were first introduced as their representatives, for each of which he charges a small sum, and the Miners are obliged to be very particular, at short intervals,

tervals, to replace all such of their possession Stowses as are broken or gone.

If a known unoccupied Vein crosses the choicest Paddock which a Farmer has, or even his Garden, or the Park of a Gentleman within the King's Field, he must take it of the Bar-Master, by the payment of a Dish of Ore, and erect these sham Stowses, and even a real one, and make periodical attempts, however slight or colourable they may be, to work the Vein; or any other person, by application to the Bar-Master, may dispossess him of such Vein, and enter on his Lands, and without mercy dig, delve, and make poisonous Buddle-Ponds, Ways, and Roads therein. The Mining Laws, as observed above, required, not merely the discovery of a Vein, of which there are thousands which either carry no Ore, or so thin a Rib between hard rocky skirts, that Lead must bear three or four times its usual price to make such Mines answer to work, but the Mine must *actually have been worked*, so far at least as to obtain the King's Dish of Ore, before possession of it could be given by the Bar-Master: but as the spirit for cultivation and improvement arose, and Gentlemen and their Tenants were desirous of excluding needy and ignorant adventurers from destroying their improvements, more I should hope from the desire to second these laudable views, than to obtain a Dish of Ore for their employers and their own Fees, the Bar-Masters seem to have relaxed in their enquiries after proofs, that the King's Dish of Ore presented to them, was actually obtained from the Vein, which they were officially called on to grant a title to: all this might have been well, had not an evil of another kind arose from it, viz. that of Adventurers, speculating on the probable range of all the valuable Veins, and obtaining numerous Takers Meers of such Mines, in the fore-fields of the works, which have been pursued by the labour of Ages, under Shale and Toadstone, at the most enormous expenses, by the Proprietors of the old Mines, who now see themselves, in too many instances, shut up and precluded from the erection of powerful Engines or driving Soughs on a larger scale, in order to pursue their fore-field on the one hand, by the *titles* thus obtained by Adventurers, who have long since stowsed the range of their Vein above, even on the hills composed of Grit-stone Rocks and Coal-measures, as may be seen on the eastern side of Matlock Parish, in the supposed range of Gregory Vein, on Cromford Moor, in the supposed range of Gang Vein, &c. &c. although in such situations no Lead has been obtained, or the slightest vestige of a Vein been seen, by these Speculators, on the deep range of the old and profitable Veins; while on the other hand, such ancient and spirited Proprietors are prevented from penetrating the Toadstone and lower Rocks, in several instances, and working back, under the other titles, upon the Basset parts of their own Vein, by a set or sets of Proprietors of such titles, once perhaps profitable, but now and long since only nominally held, by sham Stowses, and as sham occasional workings.

Another misapplication of these Mining Laws, is I think to be seen, in suffering Miners of the lowest class, without the requisite property, or any intentions of opening and further exploring ancient and disused Mines, to take possession of such from the Bar-Master, only for the purpose of delving in, and *Buddling* the old Hillocks on the surface, in search of small particles and quantities of Ore which had been thrown away by the first Miner, and perhaps by one or two previous sets of Cavers like themselves, who had in modern times, to the great damage and vexation of the Farmer, turned over and spread these barren Mine-Hillocks without remorse, *over the surface of the cultivated Lands;* on the W side of Wensley I saw some shocking doings of this kind, as well as in other places. On the whole, I cannot but recommend a speedy revisal and alteration of these Mining Laws, which will be seen from what I have said, to have originated in times and circumstances that were as unlike the present as it is possible to conceive, and which can henceforth, in their present form, tend only to the injury and vexation of the Farmer, to the prevention of that spirited and enlarged System of Mining which is now only applicable, and to the material injury of the interests which the Crown has in the Lead Mines of Derbyshire; for it is to be observed, that these Laws apply only to Lead, probably because at the time of their institution, no other Minerals of value were known to exist in the district, and that the Zink, Manganese, Copper, and Iron Ores, Fluor, Barytes, Chert, Calcareous Matters, China-Clay, &c. which the Miner may discover or raise in the King's Field cannot be removed, any more than Soughs or Water-levels can be driven to his Mine, without the free and uncontroled consent of the Land-Owner and Occupier, which from the clashing of interests above referred to, is not very likely to be obtained, on terms which will remunerate the Miner for any spirited exertion, in search of such articles.

The King, or his Farmer of the Mineral duties, now seldom works his half Meer of ground on the new freeing of a Mine, but usually the same is valued by two or three experienced Miners, named by the Bar-Master, and the same is offered to the finder or owner of the

Founders-meer, at from 1*l.* to 100*l.* according to circumstances, and generally is purchased by him and worked with his other Meer or Meers. The Duke of Devonshire is the present Leasee of the High-Peak Mineral Duties; those of the Low-Peak, or Wappentake, have very lately been sold under a Decree of the Court of Chancery, during the currency of the present Lease, and are supposed to have been purchased by Richard Arkwright, Esq.

All Lead Ore which is dressed ready for sale in the King's Field, is obliged to be measured in presence of the Bar-Master, before it is removed from the Mine; for which purpose a rectangular box is used in the Low-Peak, 28 inches long, 6 wide, and 4 deep, called a Dish, and reputed to hold 14 Winchester Pints when level full; while in the High-Peak, 16 Pints are reckoned to the Dish. In the measuring of Ore at present, every 25th Dish which is measured, is taken or set aside by the Bar-Master, as the King's Lot, Cope, or Duty: and in case of a Composition being due to Soughers who free the Mine of Water, as $\frac{1}{6}$ in Wirksworth, and of Tithe being payable, as $\frac{1}{40}$ in the same place, the Bar-Master causes every 6th and every 40th Dish which is measured to be set aside or laid in a separate heap, for the use of the Parties, and so of the Lord of the Manour's Dues, if any such are payable where the Mine is situated, as at Crich, &c. The *Meer* in a Pipe-work, or horizontally extended Mine, is 14 yards square. The Ore from Pipe Veins is generally more compact and solid than from Rake Veins, and usually is covered by an irregular stratum of Clay.

Methods of working Lead Mines.

In the Introduction to the last Section, page 243, the nature of Rake and Pipe Veins have been described, and in this, page 317, the processes of Boreing, Sinking, Ginging, Soughing, carrying-wind, making Air-shafts to prevent damps, &c. have been shortly described; and in order to render the origin and principles of the Mining Laws intelligible, I have touched on the original or shallow working of Rake Veins, page 359.

Except where Horse-gins are used, it is not common to sink very deep Drawing-shafts to Lead Mines, especially as dividing the same into several Lifts or *Turns*, often suits the hade of the Mine; such Turns or underground Shafts, being connected with each other, by means of short Thurls or horizontal Galleries. The persons who sink Mine-Shafts are usually called Shafts-men, and those who drive Levels or Gates, Level-men or Gate-men. The Miners who dig the Ore are usually called Copers, from their working at a certain Cope or price per Ton or per Load of Ore, which they get: in some large works, the price per Ton or per Load is fixed at the commencement of each quarter: but where the Mine is tolerably productive, bargains of this nature are generally made twice in the quarter, viz. for six and for seven weeks alternately; it is not customary for the Owners to advance any of the Cope Money on account; but at the end of the bargain, the Miners having dressed up the Ore that they have got, it is weighed if by the Ton, or measured if by the Load, in the presence of the Bar-Master and his employers as above mentioned, and at the Pay-day, which is usually a forta fortnight after the ending of the quarter or half-quarter, they receive the money for the Quarter's Reckoning.

In working the deep Rake Veins, of which I am now speaking, a roof of Bunnings, or of Shale or Toadstone, may be supposed over the Miners' heads, who in some works, drive only one Stoop of work, that is, a height of four to six feet before them, while in others, where many Men are employed, two or three Stoops are carried on at the same time, the upper one being kept forwards two or three yards and the next as much before the lower one or sole, like steps, by which means the Miners do not interfere with each other materially. The face of a Stoop or Fore-field of the Mine, is seldom worked upright or straight, but is hollow in the middle, to suit the swing of the Miner's Pick, many of whom pride themselves much on the neatness of the face of work which they preserve, in moderately hard Veins, where the Pick alone is sufficient for the work. In Gang Mine, where a *Slickenside* runs through the Vein, the Miner avails himself of a curious property attending such Veins, by drawing laces, stoops, or nicks, at about six inches apart and four inches deep, with the point of his Pick, from top to bottom of his face of work, which he then leaves for several hours, and on his return, finds all the Vein-stuff so furrowed, spelled, or slappeted off, and laying on the sole ready got to his hands. But it more commonly happens, that strong Picks, Hammers, and strong iron Wedges, or even frequent blasts of Gunpowder are necessary, for loosening and getting the Ore and Spar: the former of which, as well as the lumps of Spar or Vein-stuff which he judges to contain Ore, the Coper collects into shallow oval spel Baskets, called Whiskets, and these are taken from him by the Boys called Setters-on, who carry the same a stage of about 12 yards, along the Sole or Gate of the Mine, and then hand them to other Boys, who carry them a similar stage, each returning with an empty Basket, until the Stuff thus reaches the Kibble or small Barrel at the bottom of a Turn, or underground Shaft, which Kibbles, when full, are wound up by the Turn-drawers, who convey it to another Turn, and so on, until the Kibble of Stuff reaches the top; unless Horse-gins are used, when the Setters-on carry their Whiskets of Stuff to the Bridging-floor or foot of the Shaft, where the Bridger empties them into a larger Tub called the Geer-barrel, which when full is drawn up the Shaft.

The Coper or Miner throws the refuse Vein-stuff and parts of small Riders, or the skirts of narrow parts of the Vein, which he has found it necessary to blast or cut down, behind him on the Sole, until a shift or shift and half of work is performed; when he begins drawing the Bunning or Stemples forwards; this consists in forming a hole in the solid side or skirt of the Vein with the point of his Pick, at about five feet above the Sole, and opposite to it in the other skirt, striking out a sort of upright Mortice in the Skirt whose bottom is level with the opposite hole; he then chooses or cuts a Stemple or Booth of the right length, that is, a piece of Wood of the size of a Man's Arm, or larger, according to circumstances, having one end cut to a round blunt point called the egg-end, and the other square and a little lessened, called the head. This round point he enters into the hole cut in the skirt, and the other into the top of the mortice or groove cut in the opposite skirt, and then by a Hammer or his Mattock, drives the square end down to the bottom of the mortice, by which means the Stemple becomes a firm and immoveable

moveable Strut across the Vein; when four or five of the Stemples are thus fixed, flat pieces of wood called Fails are laid across these, and then the Coper proceeds to lay up his Deads, or pieces that contain no Ore, on to these Fails, called the Bunning: after building up a kind of Wall in the front, with the larger lumps, the remainder are thrown over this, on to the Fails; more of the Stemples and Fails are then fixed, and the Deads thrown on to them, until the Sole is quite cleared, when the getting of the Ore is resumed, as before. The produce of Ore, even in the same Rake Vein, varies exceedingly; in the present fore-field of Gang Mine, a superficial yard of the Vein, or one yard deep and high, produces often, near to the Shale, upwards of 1600 lbs. of Ore, while in other and lower parts of the same Vein the produce falls short of 300 lbs.

The working of the Ore in the thicker Pipe Veins, is by Stoops in the fore-field, of a certain width, as described above, only the Waste or Deads must here, be disposed of in piles, or between walls erected for preserving the Gates, more in the nature of Coal-working, except that the Roof of a Pipe Vein rarely wants any supporting, owing to the solidity of the Rock, and the Pipe Vein mostly having an arched roof, or rather the cavity is of a lenticular form, horizontally: and such appear to me, to be occasioned by the shrinking of the Rock, and to have been filled by infiltration, as well as the Rake Veins, mentioned page 246.

In working the smaller or thin Pipe Veins, it is necessary, to cut out or enlarge the height of the Gates or Passages, as in working thin Seams of Coal: the Men working at which, are obliged to crawl on their hands and knees, or even work laying along on their sides, in many instances.

Bache Thornhill, Esq. of Stanton in the Peak, is the only person in Derbyshire who works Lead Mines of any consequence, on his own account, without Partnership; this was the case in the Manour of Ashover, until lately, that Sir Joseph Banks has begun to sink some Shafts, and make some trials upon his Estate at Overton, on his own account; principally with a view to employing the Miners in that Neighbourhood, in case any discovery of Lead Ore should be made, who have been thrown out of employment by the stopping of Gregory and Westedge Mines. In general, as small Shares as 48ths, 96ths, or even 384ths and 768ths are held in the Derbyshire Mines, and the very smallest Mines have often many partners concerned in them: originating in the mode of granting Titles originally by the Bar-Master, as explained above, the facility with which shares are sold and transferred, by entry in the Bar-Master's Book, and in the numerous consolidations of Titles which have necessarily taken place, to form large works, such as what is now called the Gang Mine, and others of that class. The Owners of Manours and Estates within the King's Field, who are possessed of Mineral Rights, none of them commute with the Miners for fixed Rents, but all take their Cope, or share of Ore in kind, at each Ore-weighing, as the King, the Sougher, and the Tithe-owner do (see p. 365): which last impost is paid only in Eyam parish, and in Wirksworth, including Cromford and Middleton. The pretence of claiming *Tithe of Lead Ore*, is said to have been, that the Ore *grew and renewed* in the Vein! About the year 1780, the Gentlemen Miners, or Maintainers, as they are called, in Wirksworth, met the Clergyman, and agreed on $\frac{1}{20}$ as the Tithe-owner's share of saleable Ore from the Mines, but the working

Miners, when they came to hear of it, all met, and unanimously resolved to pay no more than $\frac{1}{40}$ of their Ore as Tithe, which the Clergyman, the Rev. Mr. Tillard, much to his credit, accepted without further dispute, and the same has continued ever since to be the proportion paid in that parish. In Ashover, Matlock, Darley, and other parishes, expensive litigations were carried on by the Clergy previous to this time, for enforcing the Tithe of Lead Ore, but without success.

The Miners generally descend to, and ascend from their work, by means of a *Ladder-shaft* or Climbing-shaft, which consists of two vertical rows of Stemples fixed across the Vein, at about a yard apart, like two ladders set upright, between which the Miners straddle from one set of stamples to the other, holding at the same time by each hand, and by this means they ascend or descend with the greatest celerity and safety.

Previous to the use of Gunpowder in Mining, Fires of dry Wood were made, against the forefield of the Vein, which, owing to the heat, loosened and slappeted off, as mentioned respecting Slickenside Veins (p. 367): the Mining Laws provide, that such fires should not be lighted, or any smoke made in a Mine, during the Mine-hours or mineral time of the day, that is from eight to four o'clock. By means of these Fires, it is surprising to see, what narrow Veins and mere scrins, the Old-Men contrived to work, for great distances into the Rock, using long-handled rakes or hoes, to draw out the loosened Ore and Spar; and hence the name of Rake-Veins is said to have originated.

Besides the regular Mines of Lead Ore, there are a few places where it has been procured, in some quantities, in what appear to me as probably to be *Stream-works*, or natural alluvial accumulations of Ore and

Spar, similar to those of Tin in Cornwall, viz. at Green-Lane, S of Brassington Town, on the Shale; on the S of Great Longsdon, on Shale; on the W of Over-Haddon, in the Lathkil, near Mandale Mine, on 1st Lime; and at Priest-Hill, near the Lathkil, in Stanton, on Shale. I know that the common opinion is, that the Ore found in these cases, is the remains of what the early Miners carried to these places to dress, for the convenience of the Water: it may have been so in some of the cases, perhaps, but could not in all of them, I think. That masses as ponderous as Lead Ore, have been moved considerable distances, in common with other alluvial matters, is clear, I think, from several masses of Lead Ore, one it is said weighing 60 lb. being found about 25 years ago, in deepening the Water-course below nether Sturston Mill, near Ashburne, on Shale; and from a mass of Lead Ore, which I saw myself, weighing 25 lb., that was taken from the Gravel-pit at top of the Hill, in the Village of Wyaston in Edlaston.

Dressing of Lead Ore.

The Ore and Spar from Lead Mines is, as observed p. 368, drawn to the surface in small barrels or Kibbles by Men, or in larger greer Barrels by Horse-Gins, which are attended by a Gin-driver, who stops his Horse or Horses, when the Barrel is arrived at top of the Shaft, and the Striker then lands, unhooks, and empties the contents, on to the Striking-floor, and having again hooked on the empty geer-barrel, he proceeds to sort the Stuff or Bowse into three parts, viz. Knockings, Ridlings or Picking-stones, and Fell, the latter being what passes through an inch iron wire Sieve or Riddle, in which the Ridlings or Picking-stones remain. The Knockings, which are large pieces of Spar or Stone, most of them with Ore intermixed or adhering, are put into a barrow, and wheeled to the Bank, the Ridlings are emptied into the swiller and picker Women's Whiskets, or wooden Hoppets, brought and set near to the Striking-floor for that purpose, and the Fell he removes to the Fell-heap near, by which means the Striking-floor is again clear, and ready for the next geer-barrel.

The Women (or Men) called Swillers, have a large tub, which they call the Swilling Tub, nearly filled with water, and a Riddle or iron wire Sieve with inch openings, having handles projecting above the sides or rim of the Riddle; into which Riddle she puts a quantity of Ridlings from the Striking-floor, and having sunk the sieve into the Swilling Tub, she gives a twisting and brisk motion to it, as she holds it by the handles, by which operation the dirt is washed off the Ridlings, and sinks in the Swilling Tub; but sometimes the washing is performed in a square wooden trough, called a Standing-buddle, in which the Ridlings or Fell are stirred by a spade. The washed Ridlings are then turned over on to the Picking-board, which is usually an old Door supported on Trussels like a Table, and Women, called Pickers, there sort over the Ridlings, and pick out the clean pieces of Ore, and put them into the Ore-whisket: another sort, consisting of Spar with Ore adhering to it, is put into the Knock-stone Whisket, and the refuse Spar and Stone is put into the Picking-board Whisket, and thrown away on the Hillock. The contents of the Ore-whisket above, is emptied on to the Bing-heap in the Ore-Coe, and the Knock-stone Whisket is emptied on to or behind the Knock-stone; which is either a flat and very hard stone (p. 279), or a cast-iron plate, 7 feet long, 7 inches broad, and 1¼ inch thick, firmly supported on Trussels or Walls, and having a floor laid level with it behind, with back and end Walls, so as to form a sort of Bin or receptacle, four feet deep, for Knock-stone stuff.

The Knockings, or large pieces laid on the Bank by the Striker, are there broken with a two-handed breaking or balching hammer by the Banksman, and sorted, the pieces of clean Ore into the Ore-whisket (carried to the Bing-heap as before), and the pieces of Spar or Stone called Deads, into the Hillock-whisket (on which they are thrown away): the remaining pieces of Ore and Spar he breaks, to the size of Walnuts, or less, and leaves these in the balching-heap, to be fetched by the Knockers to the receptacle behind their Knock-stone. A set of poor Women called Cavers, after this, turn over all the rough or large parts of the Hillock, and shead or break all the lumps thrown thither by the Banksman, with square-faced hammers, called Sheading-hammers, and such pieces as they find with Ore intermixed or adhering, they break of the proper size, and carry in their whiskets to the back of the Knock-stone.

The Knockers sit before the Knock-stone, each having a thick iron plate three inches square, with an eye at the back for receiving a short wooden handle, parallel to the plate, called a Bucker; and having with a small board drawn a small quantity of the Knockings forward, on to the stone (or iron plate), the same is broken by repeated strokes of the Bucker, to the size of small pease, then called Knock-bark, which is drawn off the stone by the Bucker, and falls beneath their feet: the same being at intervals raked out by a Coal-rake, or small Hoe, into a heap behind them.

The Washers come next in order, who are provided each with a large Tub, or Ore-vat, almost filled with water, and an Ore-sieve, composed of 58 wires in 17 inches, which is the diameter of their rims (though some have 60 or 72 wires in that space), into which they put a considerable quantity either of Fell from the Striker's Fell-heap, or of Knock-bark from the Knocker's heap, and having sunk the sieve in the water in their Vat, by dexterous shakes and tosses, the Spar and lighter substances collect at the top, which they skim off by means of a Limp, which is a small board shod with Iron, and put it into a Whisket, to be thrown away on the Hillock, such first or refuse skimmings being called Fleet or fastage: the second skimming, called Toots or Rounds, they send again to the Knock-stone: after repeating these operations, of adding Fell or Knock-bark, and taking off Fleet, and Rounds for the Knock-stone, the upper and coarser part of the Ore is taken out of the sieve with the Limp, without disturbing the bedding of finer Ore in the bottom, and this washed-ore, or Peasy, is carried to the Peasy-heap in the Ore-Coe. In the washing of Peasy as above, the very small particles of Ore go through the sieve, and fall into the Vat, where they and the dirt accumulate until it is two-thirds filled, when the water is carefully poured off, and the Smitham or sediment is taken out, and laid in a heap, by a short-handled shovel, called a Groove-spade: clean water is then replaced in the Vat, and a boy or girl, called a Server, charges the sieve, still retaining its bedding of fine Ore on the wires from the last operation, while the Washer agitates and tosses it in the sieve in the water, nearly as before, skimming off the light and smaller matters, called Buddlers-offal; in this second washing, the smaller Ore goes through the sieve, and the larger is from time to time skimmed off by the Limp, and dropped also into the Vat. This operation being finished, part of the water is poured off, and the Ore taken out of the Vat by a process, called buddling the Vat, and the Ore is carried in Whiskets to the Smitham-heap in the Ore-Coe. Buddling the Vat is effected, by swilling the Vat round by a spade, and collecting the Smitham to a hill on one side of the bottom, from whence it is fished out by the Groove-spade, and the remaining dirt and sludge is washed out into the Buddle-hole, the common receptacle of all such operations, and for Buddlers-offal, the sweepings of the Coes, &c.

At the Ecton Mine, in Staffordshire, the Spar and Ore, as it is drawn and brought out of the Mine in Tram-waggons, is called Bowse: on the Hillock, this is separated into lumps of Stone, which are thrown away; Hannaway, or lumps of Spar and Stone, containing specks and strings of Ore; Goods, which are sizeable lumps of Ore; and Fell, which will pass thro' a riddle: these three sorts are separately knocked and buckered down by Women and Children; it is then washed and picked in seives, and the very small from the buckering, is lued, that is, laved in water in a sieve with a very fine bottom, the water waving over the sides of the Lue, and washing over the small Spar, &c. which goes to the Buddle-hole.

Buddling.

The process of separating the very smallest particles of Lead Ore from the dirt and Spar with which they are mixed, by means of a small stream of water, is called Buddling, and the best of the Ore so obtained is called Hillock Ore, or Pippin, a bad sort of Smitham, and the dust Ore so separated is called Belland: a very inferior species of Ore, little if at all adapted, to the Hearths, or Furnaces, which were used for smelting Ore in Derbyshire prior to the year 1747, whence it seems probable, that Buddling was little or scarcely at all practised till within the last 50 years, much as it has since prevailed, to the vexation and annoyance of the Farmers in numerous instances, as mentioned page 363, and indeed to every class of the Inhabitants, to a degree, by thickening and bellanding or poisoning the Brooks, and even the large River Derwent, at the times when the Buddlers let off their thick water and buddle-sludge. I have myself seen every part of the Derwent River at Matlock Bath, which was before beautifully clear, and limpid, suddenly made as thick and yellow as a strong solution of Gumbouge, and so continue for hours, from the Buddling operations of the Miners about Wensley, 4 *m.* higher up the River; by which, as I was told, the Fish are entirely poisoned, or driven away in dry seasons. I heard also of such losses by Farmers, from the Bellanding or poisoning of their Cattle, which drink at Brooks and Streams polluted by the Buddlers of old Hillocks and Wastes, that it is surprising nothing has yet been done to put a stop to the practice; except, perhaps, where performed on a small scale on regular Mine-hillocks, for obtaining the last portions of Ore from their Buddle-holes, Buddling ought no longer to be suffered. There were periods, when the Limestone District of Derbyshire was a vast *Mining Waste;* but now that the same equals, perhaps, the average of all England in Agricultural Improvement and produce, surely the antiquated and inapplicable Customs, or Laws as they are called, which permit such doings, ought to be revised and amended.

In order to buddle largely, a considerable supply of Water is necessary, either in a stream, or contained in a reservoir above the spot, provided with a plug or small sluice, by which it can be let down or stopped, at the pleasure of the Belland-dresser or Buddler. Buddles are of two kinds, the Jagging-Buddle and the Trunk-Buddle; the structure and operations of each of which are curious, and require much dexterity, even for Lead Ore alone, yet inferior to that which is necessary, where different Ores are to be separated, as with Copper and Lead at Ecton, and Lead and Black-Jack in some other places: yet, as the same could not be shortly described, and for the reasons above given, I shall say no more upon it, but pass on to

The Mode of Selling Lead Ore.

Formerly it seems, that considerable quantities of the Derbyshire Lead Ore, selected from the largest and most pure, or Bing-Ore, was sold in that state to the Staffordshire and other Potters, to grind, in preparing the glazes for their common wares, and hence such was called Potter's-Ore; but at present, all the Lead Ore of the County, and even that produced by the Mines in Warslow, in Staffordshire (with the exception of Ecton, where the Duke of Devonshire has a Cupola for his own Ore), is brought into Derbyshire to be smelted. Owing to the division of the Mines in Derbyshire into such numerous Shares, as observed page 370, no Miner in Derbyshire now maintains a Cupola for the smelting of his own Ore, though several of the Smelters, who will be mentioned further on, are considerable holders of Shares in Mines; nor do any Miners, I believe, send their Ore to be smelted at the Cupolas that work for hire, on their own account, except the Buddlers, and some few others, who dress their Ore in so imperfect a manner, that no Smelter will buy it. Formerly, when the Mines of Derbyshire were in their most flourishing state, there were Markets at Wirksworth, Winster, Chesterfield, and some other places, I believe, for the sale of Lead Ore and Lead; but such is not now the practice, for almost every Miner, Sougher, Tithe-owner, &c. has some Smelter to whom he sells his Ore regularly, and such Smelters attend the Ore-measurings, already mentioned page 365, and *take up* the several shares of Ore belonging to themselves and customers, as it is measured. The price of Lead at Hull, in Yorkshire, seems to be the rule principally followed, in fixing the price of Ore from time to time in Derbyshire: and though the ancient method of measuring Ore is still adhered to, yet weights and scales are now generally used also, in the Ore-Coe, at the time of measuring, and three Dishes at least, taken indiscriminately from each of three sorts of Ore, viz. Bing, Peasy, and Smitham (Belland being always sold by weight, at the rate of 53 to 60 lb. per Dish), are weighed, and the average is noted by the Bar-Master and Ore-buyers present. A Smelting House of respectability, to whom I am much indebted for their free and liberal communications, informed me, that their usual practice in buying Ore was, to consider 58 lb. as the standard weight of a 14 pint Dish of Ore, and to allow the Miners to whom they were regular customers, half the price per Ton for their Ore, that Lead bore per Fother at Hull, at the time of taking up each parcel of Ore:

and that parcels of Ore, weighing less or more than the above standard weight per Dish (from the average of three Dishes, as above), were deducted for, or allowed extra, at the rate of 10*s*. per Ton of Ore, for each pound that the Dish fell short or exceeded the standard. In such a mode of sale, it is of course understood, that the bargains are made for considerable periods of time, in order that a fair proportion of rising Markets may occur in favour of the Smelter, as a counterbalance to the falling ones which are in favour of the Miner, who thus receives a price for his Ore on the Hillock, proportionate to the price of Lead then in the Market, though the Ore is to be carried perhaps some miles to the Cupola, there to be detained some time in the process of smelting, and then to be conveyed a further distance of 80*m*. on the average, to the Market which has originally regulated the price. The Carriage of Ore, in common with that of every other article, was on Pack-Horses formerly, a drove of such horses being called a Jag, and the persons who carried Ore for hire, were called Ore-Jaggers, a name still often applied, though Carts and Waggons are now universally used in these parts, except a few Pack-Horses that may yet be seen about Buxton, Hathersage, and the very mountainous parts, the Mules used in bringing Coals and Ore to the Whiston Copper-works in Staffordshire, and the Horses and Asses used to supply some of the poor with Coals from the Pits, in different parts. The average price of carrying Ore in 1808, appeared to be 1*s*. per Ton per Mile.

On the Smelting of Lead Ore.

In the early periods of the Mining in Derbyshire, the Ore was smelted on the tops or western brows of high Hills, by fires made of Wood, and blown by the Wind only, as is supposed, piles of stones being made round the fire, and perhaps arches were formed underneath them, to favour and increase the effect of the wind on the fire: these ancient hearths were called Boles, and whence many of the highest Hills in and near to the Lead Districts obtained their names. Anciently, the Miners claimed the right of cutting Wood and Timber for the use of the Mines, and perhaps for their smelting also, not only from all Wastes and Forests within the King's Field, but from any other of the King's Forests: and there are people living yet at Matlock, who have assisted in fetching Timber, under this privilege, from Needwood Forest, in Staffordshire, for the use of their Mines in Matlock. This free-booting sort of practice* is now, however, considered as prohibited, both here and in the Forest of Dean, in Gloucestershire, and soon

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[*] I have applied so harsh a term, on account of the gross abuses in the Forest of Dean, in modern times, and here also without doubt anciently, while any Wood remained to take, which resulted from such a claim. The ancient printed Laws of the King's Field, Art. 12, pretend, that the Lot, now $\frac{1}{13}$ part of the Ore, was paid to the King *on account of this permission to cut Wood;* but is it not extremely more probable, that $\frac{1}{13}$ part of the Ore is paid to the Owner of the Soil, by those who come and dig (which any stranger, come from whence he may, can do under these Laws) for the $\frac{12}{13}$ parts of *the Ore which they take away?* especially, as the Wood has long since failed in most places, and has been withheld in all others, I believe, without interrupting the payment of the King's Duty. The lowering of such Duties having arisen, from the exhausted state of the Mines, and the necessity now, of expensive and long Soughs, large Steam-Engines, &c. (which are not mentioned or thought of in these Laws), which would have left no profit to the Adventurers without such remission of Duties, and without which, the Mines would have lain unwrought: and as they shortly will do again, in a great measure, I venture to predict, without a total revisal of these Laws, as already explained p. 363.

I hope, that others of the Mining practices here, too nearly allied to this, will share the same fate. It seems probable to me, that it was the demand for Wood or White-coal to these Lead Boles, and for Charcoal to the ancient Iron-Furnaces, Forges, &c. which occasioned the entire cutting up and destroying of the Wood and Timber, which seems to have covered even the highest of the Hills in and near Derbyshire, at an early period, as their numerous Roots in the Peat and soil testify, and even the large Trees themselves are found in the Peat (p. 311), in many situations, where the want of the shelter which they once afforded, had for ages since induced sterility and absolute neglect, until the spirit happily arose within the last 40 years, for improving and cultivating tracts so unfavourably circumstanced, both from the operations of Nature and Art.

It seems probable, that the Ports on the Trent and the Humber, were always the destination of the Pieces or half Pigs of Lead made in Derbyshire, from the distance which the ancient Boles stretch out in an eastern direction, from the Limestone district in which the Mines are found; and hence Chesterfield was always a great Mart for Lead, but particularly so, since the opening of the Chesterfield Canal to the Trent, in 1776. Thinking that it may prove interesting to some, I have made and shall subjoin,

A List of Ancient BOLES *or Lead Hearths.*

Bank (near Holmsfield), ½ *m.* SW.
Baslow, N E of the Colliery.
Bole-Hill, S of Sheldon in Bakewell.
——— ¼ *m.* NW of Upper Hurst, in Hathersage.
——— SW of Wingerworth.

Bole-Hill, NW of Wirksworth.
Chatsworth Old-Park Plantation, S E of Baslow.
Cold-harbour, in Lea.
Cromford Moor, S of the Bridge.
Eyam.
Holy-moor Top, N E of Harwood Cupola.
Matlock.
Slag-Hills, S of Butterly, near Doway-hole Lane, in Ashover.
Stanton in the Peak.
Threebirches, or Pudding-pie Hill, W of Brampton.
Unthank, ¼ *m.* W, in Dronfield.

The sites of these ancient Boles or wind smelting places are easily found, from the sterility of the spots, and the want of any herbage except a few minute weeds upon the ancient Slag and Ashes; but here, as well as on the ancient Mine-hillocks, the *Campenula rotundifolia* will be found, a diminutive plant, which my worthy Patron Sir Joseph Banks has observed, to be peculiar to spots where Lead abounds in the soil, and which cannot be made to live, perhaps, in any other situations. Most of the hard Slag has been carried away from these Boles for repairing Roads, or perhaps for re-melting at the early Slag-mills, in some instances: these Boles, and Mine-hillocks, or Paths made of the refuse of the Ore-dressings, prove fatal to Fowls, by the small particles of Lead which they pick up instead of Sand, and which poisons them.

These very ancient Boles or Wind Hearths, were succeeded by *Slag-mills* or Hearths* almost like a Blacksmith's forge on a large scale, blown by large bellows worked by Men or by Water, one of which is still to be seen attached to each of the Cupolas that can command a stream of water, for re-melting the black or drawn Slag of their Cupolas. Near one of these ancient Slag-mills in Bonsal Dale, the Slag of it, used some years ago to be laid into the Road, to be ground to Dirt by the wheels of Carriages, and then used to be scraped up and dried and re-melted on the Hearth, and strong Iron Rollers were also used for crushing the Slag for the same purpose. At the old Hearth at Hazleford Bridge, S of Hathersage, such waste of Ore was formerly made, as to have employed a set of Buddlers for ten years past, turning over the rubbish for three yards deep or more; some of the Ore thus obtained seemed to have passed through the fire and some not, which I account for, by the floods of the Derwent, which have probably at different periods swept down their Mills, Coes, &c. Thirteen hundred-weight of the Ore and Slag thus procured, generally produced them from 1½ to 4 pieces of Lead at the Cupola, as the Buddlers informed me.

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* Mr. John Martin, in 1729, described these Hearths in the Philosophical Transactions, No. 407.

Anciently, it seems, that the Crown claimed the right of smelting all the Lead Ore which was obtained in the King's Field, and took toll or duty for it; and it is said, that their Boles were so ill managed, and the exactions at them were such, that the Mines were in a great measure disused, until at length, in order to revive the Mining of this District, the Crown agreed to accept 6*d.* per Load of nine Dishes of Ore, from the Smelter, in lieu of the Smelting Claim: which continues yet to be paid to the Bar-Master, at the time of Measuring Ore, as above mentioned. The Mines within the Manours of Haddon and Hartle were also restricted by the custom of those Manours from smelting their Lead, but at their Lord's Hearth, which occasioned the Duke of Rutland to maintain one of the old Hearths at the N W end of Great Rowsley Village, long after they had been elsewhere disused: at length, about 1780, the Miners agreed to pay 9*d.* per Load (of 144 pints) to his Grace, to be at liberty to smelt their Ore where they pleased, and this last of the Hearths for smelting Ore was disused and pulled down. The remains of one of these old Slag-mills, with some Slag but imperfectly deprived of its Lead, was found, 200 yards N of Somercotes Iron Furnace, in Alfreton.

The *Cupolas* or low-arched Reverberatory Furnaces, now exclusively used for the smelting of Lead-Ore in Derbyshire, were introduced from Wales by a company of Quakers, about the year 1747, the first of which was erected at Kelstedge, in Ashover; but this is now disused and pulled down, as will be seen from the following, *List of Cupolas* in and near to Derbyshire, viz.

Barber-fields, in Dronfield (formerly).
Barbrook, in Baslow, (and Slag Mill)—Thomas and John Barker.
Bonsal Dale, (and Slag Mill)—Evans and Co.
Bradwell—Benjamin Barber.
Bretton, in Eyam—Samuel White.
Calow, E of Hathersage—the late William Longsdon.
Coppy-nook, in Stanton-Harold, Leicestershire—Earl Ferrers.
Cromford Moor, (Steeple House)—Charles Hurt.
Devil's Bowling-alley, in Alderwasley—Francis Hurt.
Ecton, in Warslow, Staffordshire, (and Slag Mill)—Duke of Devonshire.
Harwood-Moor, near Loads—George Barker and Co.
Kelstedge, in Ashover, (two formerly).
Lea, near Cromford, (and Slag Mill)—Shore and Co.

Lumsdale, in Matlock, (formerly).
Middleton Dale, in Stoney Middleton—George Barker and Co.
Stanage, in Ashover, (and Slag Mill)—Sykes, Milnes, and Co.
Stanage, ditto—George Barker and Co.
Totley, (and Slag Mill)—George B. Breaves.
Via-Gellia, in Bonsal Dale—Saxleby and Co.
Wirksworth, E of the Town—Charles Hurt.

Several of the Smelters in the above List are doing but little, and some have their Works shut up occasionally, owing to the supply of Ore being now so greatly inferior to what it was about twenty years ago. At Middleton Dale, Ore is smelted for the Miners and Buddlers, at 14*s*. for a charge of Ore, usually about 18 cwt. and 13*s*. for a charge of Belland or Dust-Ore, usually about 12 cwt.: and in these cases, the Miners sell their pieces of Lead instead of their Ore, to some of the Smelters, who are, I believe, the only Lead-dealers in the District.

The most improved *Cupolas* which I saw, seemed to be those of Sykes, Milnes, and Co. owing to the great pains which Mr. John Milnes has spent, on their construction and management. Each Cupola here consists, of a Reverberatory Furnace about 10 feet long and 6 wide in the middle, inside, and two feet high in the centre, the flame being supplied from a fire-place at the end, over a wall of fire-bricks, called the fire-bridge, one foot high, and reaching within 1½ foot of the roof, which descends gradually to the end opposite the fire-place, where it is only six inches high, where are two openings, separated by a triangular block of Fire-stone, which meet in the passage or flue 1½ foot wide; which flue curves upwards through a length of 10 feet or more, and is covered by flat stones closely jointed in fire-clay, that can be removed when the flue-glass or melted flue-dust requires cleansing; the flues above described, join by an easy curve into a tall chimney, whose top is 55 feet above the ground. One side of the Furnace or Cupola is called the Labourer's-side; here the door is situate for supplying Coals to the fire, and also three small openings, about six inches square, into the Furnace, stopped by iron plates, that can be removed when a free current of air is required, or the Furnace needs stirring. On the other side, called the Working-side, are three similar openings, stopped in like manner by moveable iron plates, and two others below them for tapping the Slag and the Lead, as mentioned below; the ash-hole also opens on this side, and has conveniencies for raking and opening the grate-bars from below, in case of their slagging up, so as to impede the draft to the fire. The floor of the Furnace, which is composed of old Furnace-slag, roughly pounded and brought to the proper form by rakes (or strong iron hoes), when in a semi-fluid state from the first heating of the furnace: and is made up nearly to the level of the small doors on the Labourer's-side, but declines so as to be 18 inches below the middle door on the opposite or Working-side; and here the Tap-hole is situate, for letting out the Lead into a large cast-iron Pan called the Lead-Pan, placed under it in a niche in the lower part of the Furnace. From the Lead Tap-hole, the bottom rises all ways, thereby forming a receptacle of the proper size for the Lead contained in a charge of Ore; level with the usual surface of which, another Tap-hole is made, under the door which is furthest from the fire-place; this is for tapping or letting off the Slag.

In the centre of the top of the Furnace, there is a small opening called the crown-hole, covered by a thick iron plate, when the Furnace is at work; above this crown-hole is a large hopper of wood, with an iron tube below it, reaching down almost to the plate which covers the crown-hole: above the iron tube the hopper is furnished with a shuttle or sliding valve, and the whole is suspended by framing from the roof of the large Building, like an immense Barn, in which four of the Cupolas I am describing are contained. Into the hopper above described, a charge of Ore is put, at leisure times during the working of the Furnace, ready to be instantly discharged into it, by removing the crown-plate and drawing the hopper-shuttle, as soon as all the Lead of the previous charge has been drawn off, and the tapping-holes are stopped up by quick-lime, tempered as mortar: so that no time or heat is lost between the charges.

In the Cupola or Furnace thus constructed, the process of roasting the Ore in a moderate heat, to expel or sublime the Sulphur, Arsenic, &c. can be performed, and afterwards an intense heat can be applied for expelling the Oxigen or reducing the Metal. The Ore which is here shot down into the Furnace at once, usually consists of five or six, or even seven or eight sorts of Ore from different Mines, or dressed in a different manner; on which mixtures, in due proportions determined by experiment, the perfection of the process much depends. Sixteen hundred-weight (of 120 lbs. each) is the usual charge; which is first raked or spread over the floor of the Furnace, and then the doors are closed to bring it to a red heat, when the doors are again opened and the Ore is raked and stirred about, first from one side of the Furnace and then from the other, so as to expose repeatedly every part of the Ore to the action of the heat and the air, during several hours: at the end of which time, the doors are again closed, and the fire increased to an intense degree, by which the reduction of the Metal is effected, the same is collected in the bottom of the Furnace, and the Slag swims on the top of it, to the depth of two or three inches. The tapping of the Slag is then performed, by poking out the stopping of lime, and the Slag flows out like melted glass in appearance, and soon cools on the stone floor of the Building; in which state it is opake, of a whitish grey colour, and moderately heavy: this tapped or white Slag, unknown here until the Cupolas were introduced, received then the name of Macaroni Slag, and used at first to be applied to the repair of Roads, and now is so at most Cupolas; but of late years, Mr. Milnes has reserved all this kind of Slag, in vast heaps in his Cupola Yard, thinking, that either the improved processes of Metallurgy, or the high price of Lead, may at a future time render it adviseable, to submit the same to some further process. The Macaroni Slag is no sooner run off, than the Smelter scatters in upon the melted Lead two or three shovels full of quick-Lime in powder, which has the effect of stiffening the remaining Slag, which floats on the Metal: by means of a Rake (or Hoe, rather), this Slag is then drawn carefully off the Metal, and raked out on to the Floor, in a semi-fluid state: this is called Drawn-Slag, and is, when cold, of a very dark or black colour, and very heavy.

The Lead-Pan is then cleared out, if necessary, and the stopping of Lime being removed, the Lead is suffered to run clean out of the Furnace into the Pan, which is then skimmed, and the Dross is thrown back into the Furnace, where it exhibits the most vivid and beautiful changes of colours imaginable; the Lead is then taken out by Ladles, and poured into seven or more cast-iron Moulds with round ends, of the proper size for pieces of Lead, which are placed in a row, and are there left to cool. A new charge of Ore is now let down into the Furnace through the crown-hole, and the same operations repeated, by means of two sets of Workmen, during every seven or eight hours, for the whole Week. The Coals used here are from Walton, and are a little disposed to cake or crozle. The quality of the Ore has become so much worse, owing to the low state of the Mines, that a charge of 16 cwt. of Ore, produces more Slag now than 20 cwt. did about 20 years ago, and is still increasing. The Ore from the Mines in Warslow, in Staffordshire, is particularly difficult to smelt, on account of the extraneous matters which the Shale seems to communicate to it.

Mr. John Milnes, who keeps a correct account of the quantity and component parts of every charge of Ore smelted at the Stanage Cupolas, and of the produce in Lead from each charge, drawing out weekly, and yearly averages of the produce, informed me, that 66 per cent. is very nearly the average produce of all the Ore which has been smelted for several years past at their Works; and that the choicest parcel of Bing Ore which they perhaps ever had, produced, when smelted by itself, only 76 per cent. of Lead, notwithstanding that some Assayers of the Derbyshire Galena have stated 82, and even higher rates per cent. of Lead, to be obtainable from it.

The Pieces or half Pigs of Lead are not of any certain weight, though the Smelter here endeavours, in filling the Mould, to approach as near to 176¼ lbs. Avoirdupoise as he can, this being the 16th part of the

Mill-fodder in use here, consisting of 23½ long cwt. (of 120 lbs.) or 2820 lbs. which is the largest of twelve Fodders used in different places*, to the no small inconvenience and disgrace of this Trade. The Derbyshire Lead is re-weighed at Stockwith, when transshipped from the Chesterfield Canal-Boats into Coasting Vessels laying in the Trent, by the Fodder of 2408 lbs. according to which weight the Smelter makes up his Invoice to a London Lead-merchant, but on its arrival there, it is re-weighed by the Fodder of 2184 lbs.; or, if consigned to the Hull Market, it is there re-weighed by the Fodder of 2340 lbs.; and yet the Custom Duties are payable on the Fodder of 2240 lbs.

The drawn or black Slag which has been mentioned above, is first broken small with hammers, and then mixed with the Pit-coal Cinders, which fall through the bars of the Cupola fire-grate, which are made to drop into water underneath to extinguish them: and with these the Slag-Mill Hearth (see page 383) is charged and blown, the Lead as it is revived collecting in a hollow beneath the Cinders and Slag, which last, stiffened by Lime, and raked off at the conclusion of the operation, appears as an imperfect black Glass, which is sold to the Road-Surveyors. This *Slag-Lead* is much harder and more sonorous when struck by a Key or other small piece of Iron, than the soft or *Furnace-Lead*, made in the Cupolas; and in order to distinguish them, the pieces of Slag-Lead are cast in Moulds with square ends instead of round, as those used at the Cupolas are. For Red-Lead making, Shot making, and some other uses, the Hard or Slag-Lead is preferred.

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* In Dr. Rees's new Cyclopædia, article *Fodder*, these are particularised, as well as the places where they are severally used.

The great draught of air which the high Chimneys of the Cupolas occasion, seems to render the operation inoffensive, to the Smelters employed *in* the Cupola Buildings, as their appearance, and the length of time which they continue to work at them, sufficiently prove, where they live at a distance from their work, as usually is the case; but the noxious fumes of the Cupola and Slag-Mill Chimnies, descending by their weight on the ground, for a quarter of a mile or more round them, poison the herbage, so that Cattle are affected, and if continued there, soon die, of a disorder called the *Belland*, which will be noticed in Sect. 2, of Chap. XVI., as affecting also the health of the Inhabitants, in some cases. As the Cupola Owners are obliged to pay a rent to the adjoining Farmers for the damage their Smoak does to the Lands, the most barren and rugged spots are of course chosen for the erection of Lead Smelting-works, and they ought also to be in more sequestered and unfrequented places, than many of them are found in. After a Lead-work has existed for a long time, it so affects certain spots where the fumes alight, that neither wood or any other vegetable produce, can exist in such spots. Several Manufactures of, or that are connected with Lead, will be noticed in Sect. 8, of Chap. XVI. At Ecton Cupola, Fluor Spar from Knowle's Mine in Matlock, is used by way of a Flux.

4. *Tin.*

I have complied with the Plan of the Board's Reports, in order under this head to mention, that the Ores of Tin are unknown in Derbyshire, or any where near it, I believe.

5. *Iron.*

The valuable Coal District, which is coloured dark Green in the Map of Strata and Soils, facing page 97, contains many strata of blue and of white Binds, and some of black Binds and Shales, which contain numerous layers of Nodules, of different sizes, and some bands or thin strata of rich compact Argillaceous Iron Ores; for the properties of which, I beg to refer the curious in these matters to the different Papers in Mr. Tilloch's Philosophical Magazine, vol. 32, and others, written by Mr. David Mushett, an able and scientific Iron-Master and Collier, late of the Somercotes Works, in this County, but who is now engaged in another concern at Coleford, in the Forest of Dean.

The richest Ironstone is found towards the middle parts of the dark Green district, extending from Dale Abbey S, to Tankersley, and much further N into Yorkshire: a List of 75 places where Ironstone has been worked, has been given already, in describing the Coal Strata of this district, page 217.

In very early periods, the Ironstone of Derbyshire seems to have been known, and *Charcoal Furnaces* and *Bloomaries* to have been erected for the smelting of it, and making wrought Iron in various places. The first mode of working or getting Ironstone, seems to have been, by removing the soil, clay, &c. and laying the Ironstone Beds bare, called Open-works, or Open-casts; in the conducting of which, little or no regard was paid to the subsequent levelling of the ground, from which circumstance, and the great length of the basset which was thus run over, without obtaining much Ore, especially in rising grounds, or where the Measures dip fast with regard to the surface, it becomes easy now to trace most of the rich Ironstone Beds, by the marks of these primitive Open-works, or Rakes, as they are called. After the bassets had thus been all worked, a method of working was adopted, called *Bell-work*, in which a round Pit, of the usual size of a Shaft, is sunk, until the Ironstone is reached, from 3 to 10 yards deep, the first two or three yards being made cylindrical, and the part below it conical, in order to reach a larger surface of the stone, which being got below the shaft, and a drain laid across it for connecting with the next Pit, the Workmen, or Ironstone-men, begin to hollow out the Measures all round the Shaft into the form of a Bell (whence the name), throwing the refuse into the centre, and getting the Ironstone as far under as possible on all sides: which done, the Pit is abandoned, and another began at a proper distance, the soil from which is tumbled into the last Pit, as fast as it is drawn, until the stone is reached and got as before, when another Pit is begun, and so on: and this method of Bell-pits still continues to be used, unless when the depth becomes very considerable, or a hard Measure lays above the Ironstone, which may serve as a roof in *Thurling* for it, or admit of working it in short Banks, as Coal is wrought*, in the method described p. 344, which should always be done when practicable, in order to avoid the waste of Ironstone in the angles, or Buckles as they are called, between each four adjacent Bell-pits. At New Brampton, near Chesterfield,

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* On the west side of Adelphi Furnace, near Calow, some *Stone* beds of the 12th Grit Rock are thus worked, in Banks 10 or 12 yards long, for the use of the works.

Thurls 1½ yard wide are driven 20 yards in length, leaving 3½ yard ribs between them, until in returning back, these Thurls are widened to four yards. At Kimberworth Park, in Yorkshire, the Ironstone is thurled for, at 35 to 40 yards beneath the surface, and the most immense Hillocks of black Shale are thereby formed on the surface, as in many other places is the case: in all such instances, it will be prudent to plant Oaks, rather than to attempt to level and cultivate the soil, since if permanent Drains were made through and from one Ironstone Pit to the next, as ought always to be done, so as to prevent water standing in the holes, no situations or soils which I have seen in England, are more adapted to the growth of fine Oaks than these uneven Hillocks of black Shale, though nearly barren in any other mode of culture.

Ironstone is generally dug by the Dozen in Derbyshire and Yorkshire, which near Sheffield, is a Stack 6 yards long, 1 wide, and 22 inches high=50 cubic feet very nearly, and weighs about 4½ Ton (20×112lb.) 28*s*. per Dozen is here paid for digging, and 12 to 16 Dozen is obtained from each Bell-pit, on the Rake above the Ponds Coal, which here had been previously worked, and afforded a drainage into its old hollows.

Until about 40 years ago, small Furnaces and Bloomaries, heated by Charcoal of Wood, were alone used, for the making of either Cast or Bar Iron in these districts. At Wingerworth, one of these Charcoal Furnaces continued in some use, blown by means of a Water-wheel, until the year 1784, this work, or others in the site of it, having been used more than 180 years; and at Walley in Bolsover, another was used, until about the year 1770. The following is a List of 23

Places where I have observed the Slag and remains of *old Bloomaries and Charcoal Furnaces*, viz.

Alderwasley, in Wirksworth.
Barlow, E.
Butterley, in Pentrich.
Carr, in Palterton.
Cinder-hill, in Horsley.
Coburn, in South Winfield.
Denby.
Ford, in Eckington.
Foremarke, NW of the Park.
Foxton-dam, in Renishaw.
Hartshorn, 50 years ago.
Heanor, NW.
Jow-hole, near Beard, in Glossop.
Kirkby, SW, Notts.
Melborne (Wood-houses).
Mosscar-house, ¼ *m.* SE, in Hathersage.
New-mill, in Aston, Yorkshire.
Park-hill Farm, in Aston, Yorkshire.
Quarnford, near Wincle-Chapel, Cheshire.
Stockley, W of Palterton.
Toad-hole Furnace, in Shirland.
Walley, in Bolsover.
Wingerworth Furnace.

Numerous as these Charcoal Iron-Furnaces were at one period, before they had well nigh exterminated the Wood of the Country, as observed page 382, in 1806 their number was so far decreased, that from the returns made to the Deputies for opposing the Excise Duty, then proposed to be laid on the manufacture of Pig Iron, there were but 11 such remaining in all England, at which Iron was then made.

Iron is now made in and near to Derbyshire, only in tall Furnaces, heated with Coke of Pit Coal, and blown by Cylinder Bellows worked by Steam-engines; the first of these that were erected in Derbyshire, was at Morley-Park, in Duffield; since which, 10 other Works have been established in the order that they are set down in the following account, which is extracted from the returns made in 1806, as above, with some corrections of Names, viz.

A List

A List of the IRON FURNACES *in Derbyshire, in* 1806.

Places.	Owners' Names.	No. of Furnaces.			Tons of Pig Iron made annually.
		In Blast.	Out.	Total.	
Morley-park - -	Francis Hurt - -	1	—	1	700
Chesterfield (Griffin, or New Brampton)	Ebenezer Smith & Co.	2	1	3	1700
Chesterfield (Stone-gravel) Chesterfield Canal	Top & Co. (now Smith & Armitage)	1	1	2	700
Wingerworth - (1780)	Joseph Butler - -	1	1	2	819
Staveley - (1786) near Chesterfield Canal	Ward & Low (now Ward & Barrow)	1	—	1	596
Dale-Abbey - (1788) Rail-way to Nutbrook Canal	late English & Co. (now pulled down)	—	1	1	—
Butterley - (1792) Cromford Canal	Outram & Co. (now Butterley Company)	2	—	2	1766
Renishaw - (1792) Chesterfield Canal	Appleby & Co. - -	1	1	2	975
Alfreton (or Somercotes) branch of Cromford Canal	Saxleby & Co. (now Oaks, Edwards, & Co.)	1	—	1	1450
Hasland (or Grass-hill)	John Brocksop - -	1	—	1	723
Duckmanton (or Adelphi) 1799	Ebenezer Smith & Co. -	1	1	2	900
		12	6	18	10,329

The above 10,329 Tons of Pig Iron, is just a 25th part of the Iron which was at that period made annually, by 221 Coke and 11 Charcoal Furnaces then standing in Great Britain, of which 173 were in work, and probably the quantities and proportions do not differ greatly at the present day. Derbyshire is the 4th English County in its produce of Pig Iron; Yorkshire with 14 Furnaces, Staffordshire with 25 Furnaces, and Salop with 19 Furnaces (on a larger scale), exceeding it, and in that order.

In the Summer of 1809, two of my Sons (John and Joseph)

Joseph) having made a tour, and examined and made drawings of several of the Furnaces, Forges, and apparatus used in the Iron Manufacture in Derbyshire, and the southern part of Yorkshire: from such materials, John, the elder of them, drew up a short History and account of the whole manufacture of Iron, which has been since printed in the "*Pantalogia*," a very useful general Dictionary, by Messrs. Good, Gregory, and Newton, which is now publishing in 8vo. by Kearsley; to which account I beg to refer, for—the properties of Iron Ores—the fuel and making of Iron—description of the Blast Furnace—Operations of the Blast Furnace—the varieties of Slag—the different qualities of crude Iron—the manufacture of Malleable Iron—descriptions of the Blowing Machine, the Finery, the Forge Hammer, &c.—the process of converting Iron—Bar-iron manufacture—process of puddling Iron: subjects which require several Plates for their elucidation, and here I intend only to mention such further particulars as occur to me, and are omitted in the account above referred to. In Mr. Pilkington's "View of Derbyshire," vol. I. p. 133, there is a plan, and some particulars, of Staveley Furnace and Forges.

From a passage in Mr. Mawe's Mineralogy of Derbyshire, p. 96, it might be supposed, that Iron Ore from Lancashire is here much used, to mix with the native Ores of the County, but which is not the case at present; till about seven or eight years ago, small quantities of such were used at Staveley: I could hear nothing of the use of the masses of calcareous and sparry Iron Ores mentioned by the same author, but Mr. Joseph Butler informed me, that the Black-shale Rake (between the 8th and 9th Grit Rocks) produces a bed of Ironstone, that has a good deal of Spar in Veins or

Septa in it, called Old-Man, which, when used in the Furnace, produces a Pig Iron which won't cast smooth, but penetrates the sand of the mould, in what are called pins' points.

The only materials used in the making of Iron, which are not found in the sites of the different Furnaces, are Limestone for a Flux, and Fluor Spar at some of them, for increasing the fusibility of the Ores, in certain cases.

The Crich, Ashover, and Calver Limestone, from Quarries in the 1st Lime Rock, seems preferred, being the most pure Carbonate of Lime, where it can readily be procured; but in other situations, the yellow or Magnesian Limestone from the eastern side of the County, is used, without any complaints as to its effects in the Blast Furnace; and I have been at Furnaces where both sorts are occasionally used. At Butterley Furnace, a good deal of yellow Fluor Spar from the Crich-Cliff Lead Mines is used, and some at Somercotes Furnace, from the same place, brought by Boats.

A considerable improvement in the important process of making *Coke*, in the large way for the Iron Furnaces, was introduced at Somercotes a few years ago by Mr. David Mushett, called the Close-way of Cokeing; and which has since been adopted at Grass-hill, Renishaw, and at some other Furnaces, I believe; in this method, instead of merely making a large open heap of Coals and setting fire to it*, as is usual, several dwarf Chimnies are made on the Coke-hill, about 3½ feet high, full of openings in the lower part, and terminating at top in a short Cast-iron Funnel, which has a close Door or Valve on its top. Round several of these Chimneys, placed in a row, a stack or heap of Coals, the largest of them at bottom, are formed, as in the other method or open way, but previous to lighting, the whole heap is covered over by dust and ashes of the former burnings, except holes near the bottom left to light the heap, and which are afterwards so stopped or regulated by the Coke-burner, as to produce a perfect combustion without the flame escaping, except by the Chimneys above mentioned, and which are closed by the Valves, when the operation is finished, and the holes in the covering are also carefully stopped, until the fire is quite extinguished. At Harts-hay and some other Collieries, this method is now resorted to, for burning Coke for sale, to the Maltsters and others in the County, instead of Ovens with a small round hole in their roofs, that are used at Dunston, Troway, Ponds, and various other Collieries and Canal-Wharfs.

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* It seems surprising, that a practice so wasteful and filthy as this mode of Coke-making is, should be resorted to in the great Town of Sheffield, in Yorkshire; where the numerous Cutlery Smiths use only Coke in their Forges.

Forges, and most of whom, I am told, make their own, in the morning, in a small Yard adjoining their Shops, where they simply pile up the Coals in a heap and set fire to them, and when thoroughly ignited, in half to three-quarters of an hour they begin to rake them about on the ground, and to quench them by throwing water on them: by which the Town is often filled with Smoak, Steam, Hydrogenous Gas, and Dust, and there is great danger of fireing the Buildings in windy weather. Those who have no Yard usually fire their Coals on their Smithery Hearth, and when on fire, by a Shovel strew them about to extinguish them! Surely this filthy practice might be avoided, by Cokeing the Coals on the Coal-Pit Hills; and if done in the Close-way described in this page, or in Ovens, the saving in Carbonaceous Matter would be considerable, as well as in the expense of Carriage.

At Somercotes and some other Furnaces, the Iron Ore is roasted in Kilns, similar to Lime-kilns, with considerable saving of time and of Coals, but with some increased loss of Ore, in being crushed to pieces in passing through the Kiln, to what happens in the open heaps, like Coke-heaps, in which it is usually roasted; for pieces of roasted Iron Ore, smaller than Pease, cannot be admitted into the Furnace, for fear of choaking it. The small Ore thus sifted out is called *Minion*, and is thrown away, or used for making Paths in Gardens, &c. in which situation it sets hard and firm: or the smaller parts of it are mixed with quick Magnesian Lime, to make a Mortar of superior hardness, used occasionally about Swanwick. I suspect, that this Minion, if ground to an impalpable Powder, and mixed and ground with quick Lime, would make an excellent Cement for Water-works, that would well answer the expense of preparation.

I have already mentioned, page 232, that Ironstone in beds is found in the great Limestone Shale, and it seems to me probable, that some of the ancient Charcoal Furnaces mentioned page 396, those at Alderwasley, Mosscar-house, and Quarnford in particular, were for smelting this Stone. Those at Foremarke, Hartshorn, and Melborne, were for smelting Ores procured in the Ashby-de-la-Zouch Coal-field (coloured dark Green in the Map facing page 97), and for which purpose Earl Moira, a few years ago, erected a large Furnace on Ashby Wolds, (see Mr. Pitt's Leicester Report, p. 8), which is now resuming its operations for another trial, under the direction of Mr. Jonathan Woodhouse, Engineer. The Rake Veins in the Mountain Limestone Districts of Derbyshire, produce in a few instances, Ores of Iron*, as will be seen in the List of the Mines and their products, page 252; but these are no where here worked for smelting, I believe, any more than the *Pyrites*, Sulphuret of Iron, or Brazil of some few of the Mines, in Cromford, Eyam, Matlock, Overton, Stanton in the Peak, Stanton-Harold, Stoney Middleton, Taddington, and Wirksworth: these, being compact for the most part, and not readily decomposable, like the Brasses of the Coal-Pits, mentioned page 218, which are used at the Copperas Works.

The Mines of Derbyshire also produce Oxides of Iron, or yellow and red *Ochres*, in Ashover, Bradwell, Brassington, Brushfield, Castleton, Cromford, Great-Hucklow, Hartington, and Wirksworth, as will be seen in the general List above quoted, page 252. Ochre is also found in the Shale N N W of Sandy-brook, in Ashburne: in the Fault or Lum at Milk-hill Gate, 1¼ *m.* E of Caldon, Staffordshire; and in the Coal-measures near Dilhorn, in the same County (Pitt's Staffordshire Report, page 189), called Raddle.

When the Water from the Coal-Pits, where decomposing Pyrites abound, comes to the open Air at the mouths of the Soughs, considerable quantities of red Ochre are often deposited, and have been collected and dried for the Colour-makers, in some instances, as at Oakerthorpe in South Winfield, Berley-Moor on the confines of Yorkshire, &c.

Another species of Iron Ore, the polishing Hematites, *Blood-stone* or Burnishing Stone, is, as observed page

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* The rich Hematitic Ores of Iron near Ulverstone, in Lancashire, (see page 398), are thus found in Rake Veins in Limestone (Mawe's Derbyshire, page 131): so are the Manganesian Iron Ores of the Forest of Dean, in Gloucestershire, and of Doward, in Herefordshire, Dr. Grew's Mus. Reg. Soc. p. 330.

353, only found in a highly rounded state, among the alluvial matters of these Districts, these *Blood-stones* I have noticed at the following places, viz.

Bagthorpe, Nottinghamshire.
Grindon, 1¼ *m.* E S E, in Staffordshire.
Measham, ⅛ *m.* W.
Newhaven N E, in Hartington.
Newton Solney, 2½ *m.* S E, near Bretby Park.
Norris-hill, in Ashby Wolds, Leicestershire.
Over-Haddon, W (in Stone-Pit Mine, p. 267).
Packington, S W, Leicestershire.
Sandiacre.
Sandy-brook, in Ashburne.
Skegby, SW, Nottinghamshire.
Spondon.
Willesley, ¾ *m.* N E, and S W.

These Stones were formerly in much repute by the Button-makers of Birmingham, and by other workers of Polished Metals, who readily purchased all that were exposed by ploughing, gravel-digging, &c. and picked up in these Districts; but of late I have not heard of any being purchased, perhaps because some more plentiful and certain supply of them, or substitute, has been found: for though the Blood-stones are so very hard, and often lay very near to the surface, yet those actually exposed for any length of time, decompose and fall to an ochrey powder. On Chellaston Gypsum Hill, and in other places, specimens of other kinds of Iron Ores occur in the Alluvium.

The following is a List of the *Forges and Puddling Works* where *Bar-Iron* is made from the Pigs, in or near to Derbyshire.

Alderwasley, near Wirksworth, (two formerly)—Francis Hurt.
Brightside, near Attercliff, Yorkshire—late Swallow and Co.
Bugsworth, in Glossop.

Chapel-en-le-Frith.
Chapel Mill-town.
Chesterfield, (New Brampton)—Ebenezer Smith and Co.
Clay-Mills near Burton (on the Dove), Staffordshire.
Codnor Lower Park, (now erecting)—Butterley Company.
Killamarsh—Joseph Butler.
Makeney, in Duffield, (disused).
Rotherham—Walker and Co.
Sheffield Town—Samuel Smith and Co.
Ditto—Shelton and Co.
Staveley—Ward and Barrow.
Wichnor, near Burton, Staffordshire—Thornywell and Co.
Winshill, in Stapenhill, (disused).

At most of the above Works, they have large *Rolling and Slitting* apparatuses, for making plate Iron or bars of different sizes, down to the smallest nail-rod; besides which, there are rolling and slitting Mills for such purposes in Derbyshire, in Allsaints in Derby, and at Burrowash in Ockbrook.

Foundries or Iron Casting-houses for general purposes, are the only remaining branches of the Iron trade which I shall mention in this place; these are found at

Alderwasley Forge.
Alkmund's, St., in Derby.
Ashby Wolds Furnace, Leicestershire.
Butterley Furnace.
Chesterfield, (Butler's).
Ditto, at the two Furnaces WSW & NE.
Clay-Mills Forge, near Burton, Staffordshire.
Mathfield, (near Ashburne) Staffordshire.
Morley-park Furnace.
Peter's, St., in Derby (two).
Renishaw Furnace.
Somercotes Furnace.
Wingerworth Furnace.

The small Cupolas, or Hells as they are called, which are used in the Foundries here, were introduced about 30 years ago, for heating Pig-iron instead of Air or Reverberatory Furnaces, which, as I am told, though they answer for Cannon Balls and some other purposes, making very solid castings, yet the Iron becomes whiter, and nearer to the quality of Bar Iron in infusibility, every time it is melted in such Furnaces, losing 30*s*. per Ton of its value at each melting: by adding small quantities of Oyster-shells or Limestone to the Cokes in the Hells, the quality of the Iron can be preserved, in two or three successive meltings, but not more, I understand.

The softening and tempering of Cast-Iron Implements, and converting them to Steel, will be mentioned among the Manufactures, in Sect. 8, of Chap. XVI.

6. *Various Minerals.*

As several Mineral products of Derbyshire and its environs remain yet to be enumerated, and the Board has prescribed no particular order, for the treating of such by their Reporters, I beg to divide such into the three classes, Metals, Stones, and Earths, &c.; and by a copious Alphabetical Index at the end of this Report, I must endeavour to compensate for the want here, of a more perfect arrangement.

1*st*, *Metals.*

ZINK.—The Ores of Zink in the Derbyshire Mines, are of two kinds, the Lapis Calaminaris, Calamine, or Oxide of Zink, and the Blende, Black Jack, Mock Ore, or Sulphuret of Zink, the former in the greatest quantity.

Calamine is obtained from the Mines in the following places, viz.

Bonsal,
Bradburne,
Bradwell,
Brassington,
Brushfield,
Carsington,
Castleton,
Cromford,
Hopton,
Matlock,
Matlock Bath,
Middleton by Wirksworth,
Middleton by Yolgrave,
Sheldon,
Stanton, near Wooton, Staffordshire,
Wirksworth,
Yolgrave.

See the List of Mines, page 252. In Cromford there is a Work where Calamine is roasted and buddled, &c. and two others in Bonsal, which I believe belong to the Cheadle Brass Company. The refuse of roasted and buddled Calamine, mixed with quick-lime, makes a Mortar which sets exceeding hard, and is used by Mr. Arkwright in his Works.

In Brassington Enclosure, in consequence of $\frac{1}{18}$th of the Common being allotted to the Lord of the Manor, the future rights to the Calamine, China-Clay, &c. was assigned to the Owners of the New Allotments; for the Crown has no claim on these Minerals, or any others but Lead, in the King's Field, as observed page 364.

Black Jack, or Blende, is found in the Mines at

Alport,
Ashover,
Bolterstone, Yorkshire,
Bonsal,
Calke,
Castleton,
Cromford,
Eyam,
Matlock,
Stanton-Harold, Leicest.
Wirksworth,
Yolgrave.

In some of these the quantity found is small, and I believe that little, if any, of this Ore has been dressed for Sale, in Derbyshire: Mr. Whitehurst truly observes, that it was not until of late years that the practical Miners of this district, considered Mock Ore to be of any value, and it was either left in the Mine, or thrown away on the Hillock, among their Vein-stuff. The Brass-makers at Sheffield are supplied with a good deal of Black Jack from Broomhead-Mill and Wigtwizle Mines, near Bolterstone, Yorkshire.

MANGANESE.—It is the black friable Ore or Oxide of this Metal, which is principally found in Derbyshire, and is called *Black Wad;* it occurs in the Mines at

Alport,
Brushfield,
Elton,
Great Longsdon,
Hartington,
Hopton,
Matlock Bath,
Monsal Dale,
Parwich,
Winster,
Yolgrave.

At Wensley there is a Kiln or Furnace, for preparing this Ore, as a black pigment foo painting Ships and Buildings; and I have not heard of any other use being made in Derbyshire of this substance, than the above.

At Carsington-Hill Mine, the brown or rusty Ore of Manganese is said to occur in small quantities.

SILVER—Is combined in small quantities, in much of the Galena which is raised in Derbyshire, and formerly it was refined or parted from the Lead, particularly that from Ball-eye Mine in Bonsal; but long since the practice has been wholly discontinued, on account of the great waste of Lead, and the expense of the processes for separating the Silver.

ARSENIC, ANTIMONY, MOLYBDA.—These three Metals are occasionally found, in different specimens of Lead Ore in Derbyshire, but from their very small quantities, are interesting rather to the curious Mineralogist, than to the Miner.

2nd, Stones.

In this class of Minerals, the *Limestones* claim our first notice, as well on account of their vast quantities and varieties, as their important usefulness. They occur of various colours, as white, grey, yellow, red, blue, and black, of different hues, and are of different qualities, as Compact, Porcellanic, Granular, Crystalline, Shelly, Magnesian, Pozolanic or Water, Stinking or Swine, &c. The following is

A List of the principal LIMESTONE QUARRIES in or near to Derbyshire.

Agnes Meadow, near Atlow, Shale Limestone, water L. (see page 232).
Alport, near Yolgrave, 1st Lime.
Alt Hucknal W, blue, in the yellow L. (see p. 157).
Annesley, Notts, yellow.
Ashford, Shale L. water L. (see page 232).
Ashover S (N W formerly), and at Mill-town, 1st Lime.
Atlow, Shale L. water L.
Bakewell, 1st Lime W and N E, Shale L. N and NW.
Bank Top, 1¼ *m.* N of Dilborn, in Staffordshire, in Marl.

Barlborough E, yellow L.

Barmoor, in Peak Forest, 1st and 3rd, Rail-way of Peak Forest Canal (see pages 288 and 299).

Barrow Hill, near Osgathorp, Leicestershire, yellow L. Leicester Canal Level (see page 158).

Barrow on Soar, Leicestershire, blue Lias, water L. (see page 114), Leicester Navigation near.

Belph, near Whitwell, white in the yellow L.

Birchwood Park in Roston, grey in the yellow L? (see page 159).

Bobbers-mill, near Bilborough, Notts, yellow L.

Bolsover N, blue in yellow L. (see page 157).

Bonsal, 1st, 2nd, and 3rd Lime.

Bradburne, grey Shale L.

Breedon, Leicestershire, yellow L. (see page 158).

Bulwell, Nottinghamshire, yellow L.

Caldon Low, 1 *m.* S. of the Town, Staffordshire, 4th Lime, Rail-way of Caldon Canal (see page 284).

Calke, Dimins Dale E, in Park formerly, grey in yellow L? (see page 158).

Calton S E, Staffordshire, 4th Lime.

Castleton, 4th Lime.

Calver-peak, near Stoney-Middleton, 1st Lime.

Clouds-hill, in Worthington, Leicestershire, yellow L. Rail-way of Ashby-de-la-Zouch Canal (see p. 158).

Clown, red ponderous, in yellow L.

Conisborough, near Doncaster, Yorkshire, yellow L. Don River Navigation.

Crich, N of the Town, 1st Lime, grey, S E black and grey, Rail-way of Cromford Canal.

Cromford, 1st Lime, Cromford Canal.

Crowdycote in Hartington, 4th Lime.

Dirty Hucknall, Notts, yellow L.

Dove-hole, in Peak Forest, 4th Lime, Rail-way of Peak Forest Canal (see page 299).

Edingtree, near Hope, 1st Lime.

Eyam, 1st Lime.

Glapwell, near Alt Hucknal, yellow L.

Grace-Dieu, near Osgathorp, Leicestershire, blue in yellow L? Leicester Canal Level (see p. 158).

Greasley, Notts, yellow L.

Great Hucklow, near Eyam, 1st Lime.

Grindon (Hurs Low), Staffordshire, Shale L.

Grin Hill, near Buxton, in Hartington, 4th Lime.

Haddon, SW of the Hall, near Great Rowsley, 1st Lime.

Hall-field, near Atlow, Shale L. water L. (see page 232).

Harthill (Winney Lane), Yorkshire, yellow L.

Hassop, near Bakewell, 1st Lime.

Hognaston, Shale L.

Kirkby (Lane Head), Notts, yellow L.

Knitaker, near Barlborough, blue in yellow L. (see page 157).

Kniveton, grey and black Shale L. water L. (see page 232).

Laughton-le-Morthen, Yorkshire, yellow L.

Linby, Notts, red ponderous, and yellow L.

Maltby, Yorkshire, yellow L.

Mansfield, Notts, yellow L.

Mansfield-Woodhouse, Notts, yellow L.

Market Worsop W, Notts, yellow L.

Matlock, Town and Bridge, 1st Lime.

Mixon Hay, ENE of Leek, Staffordshire, Shale L.

Nether Langwith (HorseWood), Notts, red ponderous in yellow L.

Newbold-Astbury, 2 *m*. SW of Congleton, Cheshire, grey in yellow L? (see page 160).

Newton-grange, near Tissington, Shale L. water L.

Normanton on Soar N E, Notts, blue Lias (see page 115).

North Anston N, Yorkshire, yellow L.

Oncote, Staffordshire, Shale L.

Osgathorp, Leicestershire, blue in yellow L. Leicester Canal Level (see page 158).

Palterton, near Bolsover, blue in yellow L. (see page 157).

Peak Forest, NW of the Town, 4th Lime.

Pecks Mill, S SW of South Anston, Yorkshire (Dog-kennel), yellow L. on Chesterfield Canal.

Pindale in Castleton, 1st Lime, 3rd Lime.

Shire-Oaks, near Worksop, Notts and Yorkshire, white in yellow L. and yellow (Lady-lee), Chesterfield Canal, and Branch.

Skegby, Notts, yellow L.

South Anston E, Yorkshire, yellow L.

Sparrow-pit, in Peak Forest, 1st, 3rd, and 4th Lime.

Staniforth Lane, SW of Skegby, Notts, yellow L.

Stanton-park, in Stanton-Harold, Leicestershire, grey in yellow L? (see page 158).

Stoney-Houghton, near Plesley, blue in yellow L. (see page 157).

Stoney-Middleton, 1st Lime.

Strelley, Notts, yellow L.

Sutton in Ashfield, SW, Notts, yellow L.

Swincoe, W of Okeover, Staffordshire, Shale L.

Teversal (Wood Nook), Notts, blue in yellow L. (p. 157).

Ticknall E, grey in yellow L? water L. (see p. 158).

Tideswell, 2nd Lime.

Todwick S, Yorkshire (Red Hill), yellow Lime.

Turnditch S, Shale L. water L. (see page 230).
Walls N, in Whitwell, blue in yellow L.
Water-houses, near Caldon, Staffordshire, Shale L. 4th Lime, water L.
Weaver-hill, N of Wooton, Staffordshire, 4th Lime.
Wensley, near Darley Bridge (Duns Lime-kiln), 1st Lime.
Whitwell (Bakestone Moor), red in yellow L.
Wild-park, near Muggington, grey in yellow L ? water L. (see page 159).
Wirksworth (Yoke-cliff), 3rd Lime.

It should be observed, that the words "yellow L." in the above List, do not always denote stone of that colour, but that such strata appertain to the yellow or Magnesian Series, described in this Report, page 156: often the joints and fissures near the top of this Rock, are of a deep Red, and it is thence denominated Red-stone by the Quarriers, although the fresh fractures shew a deep yellow colour. The Strata denominated the 1st, 2nd, 3rd, and 4th Lime, are described pages 271, 273, and 280, and the "Shale L." page 229; in many instances, particular references are made to the previous descriptions of these Calcareous Strata. The above Quarries are, with a very few exceptions, situate at the edges of the calcareous districts, and where the same is most accessible by means of Canals, Rail-ways, and Turnpike or other Roads, from the districts where there are no calcareous Rocks; for in the interior of calcareous districts, large Quarries (except of Free-stone, in some few instances, which will be noticed further on) are never seen, since every Village, and almost every Farm, has its own Limestone Pit in such situations.

At most of the Quarries in the above List, there are Lime-kilns; I shall not, however, enter into the particulars of their construction, or the expenses of burning Lime, and the sale price of the article, in this place, because it will come more properly in Section 3, of Chap. XII., when I treat of the agricultural properties of Lime, the private or Farmers' Kilns, and the cost and process of Liming Lands, which is the great and most important source of consumption, from nearly all the Quarries mentioned above. Where the whole, or some particular beds of a Quarry, are adapted to make Lime for water-works, such are distinguished by the words " water L." in the above List.

MARBLE.—Several varieties of the Limestones of this district, are in repute as Marble for chimney-pieces, slabs, &c. by the names of White, Grey, Dove, Blue, Black; or of Figured, Bird's-eye, Dog-tooth or Muscle, Entrochi, Shelly, Breccia, &c. Marbles: see Mawe's " Mineralogy of Derbyshire," pages 89 and 90. The following is

A List of the MARBLE QUARRIES.

Ashford W, black, Shale Limestone.
Ashover (Lexley Quarry), grey, Entrochi, 1st Lime.
Bonsal, grey, Entrochi, 3rd Lime ?
Buxton (Mill Dale and Lovers Leap), white, 3rd and 4th Lime.
Caldon Low, Staffordshire, red, black, &c. Breccia; in Veins in 4th Lime.
Cressbrook Dale, near Little Longsdon, black, 3rd Lime.
Cromford (Deanwood Dale), grey, Entrochi, 1st Lime.

Foolow S, grey, Entrochi, 1st Lime.

Great-rocks Dale, near Tunstead, white granular, in a wide Vein in 4th Lime.

Hassop, grey, Entrochi, 1st Lime.

Matlock (Boat-house), grey, Entrochi, 1st Lime.

Monsal Dale, near Little Longsdon, black, 2nd Lime.

Monyash (Brecks), blue, Entrochi, 1st Lime.

——— (High Low), bird's-eye (Entrochi), 1st Lime.

——— (Ricklow-dale and Henmore), grey, figured (Entrochi), 1st Lime, 2nd Lime.

——— (Ricklow-dale), purple-veined, Entrochi, 1st Lime.

Slaley SW (Wass'), in Bonsal, Anomia shelly, 4th Lime.

Snitterton S, black, 1st Lime, or Shale L. ?

Tideswell, ½ *m*. N, black, 2nd Lime.

Wetton N, Staffordshire, Dove coloured, very small Entrochi, 4th Lime.

Wirksworth, 1 *m*. W, black, 3rd Lime.

At Ashford, Mr. Platt has a Mill for sawing, scowering, and polishing of Marble, worked by Water; in St. Alkmund's, Derby, Messrs. Brown and Co. have most complete works for these purposes, wrought by a Steam-Engine; Messrs. Evans and Co. have also Marble Mills in Derby; and Mr. White Watson, of Bakewell, prepares and fixes Marble Ornaments, Monuments, &c. of the native and foreign Marbles.

Besides these Calcareous Marbles, there is a bed of Ironstone, eight or ten inches thick, abounding with the impression of Muscle Shells, called Dog-tooth or Muscle Marble, which is sometimes polished and introduced with good effect into Chimney-pieces, as in Bolsover Castle, &c.: it is to be had at Tupton, and various other places, in a line through the Coal District, between its 9th and 10th Grit Rocks (see p. 217), except about Sheffield in Yorkshire, where it is scarcely known.

CHERT.—This silicious Stone, very nearly resembling the black Flints which are common to the upper Chalk Strata (see page 111), is very commonly found in layers of nodules, or in thin beds in the upper part of the 1st Lime Rock (see page 272), and sometimes of the 3rd Lime Rock also (see page 273); but as this black Chert is seldom if ever applied here to any use, not even to the repair of Roads (the Limestone being preferred), I shall not here insert my List of Places where these nodules most abound, for they seem very unequally distributed, and not improbably, owe their origin to transmuted or transformed Limestone, as well as the occasional masses of white solid Chert, containing, sometimes, the peculiar shells entire of the Limestone Rock in which they are found, called *China-stone*, which have been described pages 272 and 273; and those superficial and loose blocks of porous Chert (owing to the cavities left by the decomposition of the organized substances in it), called *Burrs*, or Chert Screw-stones, which have been mentioned page 272: see also, Mr. Whitehurst's "Inquiry," 2nd Edit. p. 233.

At the E end of Alport Town, near Yolgrave, the surface of Tufa, of modern formation, is thus changed to Chert.

FREESTONE.—The *Freestones*, or those capable of being broken or hewn with equal ease, or nearly, in any direction, for use, and thence often called Building-stone, or Ashler (in distinction from Beddy-stone, Flags or Paviers, and Slate or Tile-stones, which will split only in one direction, or Canks, which are too hard and brittle to be cut), are in this district all silicious or sand-stones, except occasional beds in some Quarries of the Limestone Strata, and the Tufa of Matlock Bath, &c. used in Buildings there and at Alport, &c. The following is

A List of Free *or* Building-stone Quarries, *or Delphs.*

Abbey-dale (Park Bank), in Norton, 4th Grit Rock.
Allestry S E, Grit, in the Red Marl.
Alpert, in Hope Woodlands, Shale Grit.
Alport in Yolgrave, Tufa from an ancient Spring.
Alton in Ashover, NW, white 3rd Grit: E (Briton-wood) 4th Grit.
Alton in Wirksworth, Shale Grit.
Ashby-de-la-Zouch, Leicestershire, ½ *m.* S, Grit, in Red Clay.
Ashley-hay in Wirksworth, Shale Grit.
Ashover E (Rhode's Quarry) 1st Grit: W (Amber-hill or Slack) 1st Grit.
Aston W, Yorkshire (Millstone Hill), Grit.
Bakewell-edge, E of the Town, Shale Grit.
Barlborough SW (Marston Moor), 13th Grit.
Beighton S, 12th Grit.
Belper N (Weir, and New Swinney), 1st Grit.
Belper-gutter (Hall Lane and Shaw Lane), 2nd Grit?
——————— (Hunger Hill), 3rd Grit.
Belph in Whitwell, white Lime, in yellow L.
Birchover N E, near Winster (Moor), 1st Grit.
Birchwood-moor in Norbury, white Gravel Rock?
Birdholme, S of Chesterfield, 10th Grit.

Blackfordby, in Ashby-de-la-Zouch, Leicestershire, Grit, in Red Clay.

Blackwall N E, in Kirk Ireton, Shale Grit.

Bolsover Moor, E N E of the Town, yellow Lime.

Bradnop, E of Leek, Staffordshire, Shale Grit.

Bradway (Hempyard-lane) in Norton, 6th Grit, blue.

Brailsford, N of the Church, white Grit, in Red Marl.

Bramcote, N E of Leek, Staffordshire, 1st Grit.

Bramley-moor, W S W of Eckington, 9th Grit.

Brassington (Harboro Rocks), yellow Grit of 3rd Toadstone (see p. 279).

Bredsall Moor N N E, salmon-coloured Grit.

Bretby, ½ *m.* N, and E of Hall, Grit, in Red Marl.

Brimmington N, 8th Grit; and W (Wildens Mill) 8th Grit.

Bull-bridge in Crich, Shale Grit: by Cromford Canal.

Burton, S of Trent Bridge, Grit, in Red Marl (see p. 148): by Trent Navigation.

Butterley in Ashover (Raven's Nest Tor), Shale Grit.

Butterton, ½ *m.* W, Staffordshire, Shale Grit.

Buxton NW (Corbar Quarry), Shale Grit.

Calke E, white Gravel Rock ?

Callow (Hascar side) in Wirksworth, Shale Grit.

Calow in Chesterfield (Upper Lane), 6th Grit; E end of the Town, 10th Grit; and near Adelphi Furnace, 12th Grit, thurled for, see p. 394, Note.

Chapel-en-le-Frith N W, Shale Grit: by Rail-way of Peak Forest Canal.

Chapel Milltown in ditto, Shale Grit: Railway ditto.

Charlesworth in Glossop, 3rd Grit.

Chevin Top, S S W of Belper, 1st Grit.

Chilcote (Town, and Honey Hill), Grit, in Red Marl.

Chinley (Churn) in Glossop, 2nd Grit.

Clay-cross W, in North Winfield, 9th Grit.

Clifton S, near Ashburne, Grit, in Red Clay.

Coddington (Carr) in Crich, 1st Grit: by Cromford Canal.

Coxbench in Duffield, 3rd Grit.

Cromford (Stone-house, and Moor), 1st Grit, salmon-coloured.

Culland in Brailsford, Grit, in Red Marl.

Cunsal, NW of Kingsley, Staffordshire, 1st Grit: by Caldon Canal.

Dale-Abbey (Hag), salmon-coloured: & (Furnace) Grit.

Dane-Bridge, near Swithamley, Staffordshire, Shale Grit.

Deer-leap in North Winfield, 4th Grit.

Disley, Cheshire (Jackson's Edge), 2nd Grit.

Dronfield, 9th Grit.

Duffield Bank N E, 1st Grit.

Ecclesball Barlow, Yorkshire (Brincliff Edge), 4th Grit.

Eckington (Marsh), WSW of the Town, 9th Grit.

Edensor S (in Park), Shale Grit.

Edge-moor in Crich, 1st Grit.

Ellaston, ¼ *m.* N E, Staffordshire (Northwood), Gravel Rock.

Farlow-green in Belper, 1st Grit.

Foremarke-park, ⅓ *m.* W, near Cadhouse Lane, Grit.

Forest Chapel, Cheshire (Stoneyway Gate), 1st Grit.

Froggatt E (Froggatt Edge), 1st Grit.

Grooby, Leicestershire, Sienite (see p. 152).

Grimsthorpe, near Sheffield, Yorkshire, 10th Grit.

Hadfield in Glossop, 2nd Grit, blue hearted.

Hansworth NNW, Yorkshire, 12th Grit, blue hearted.

Hansworth-Woodhouse S, Yorkshire (Purslow), 12th Grit; and N E (Shoeberd), 12th Grit.

Hardwick-hall SW, Sand-stone, under yellow Lime.

Hartshorn (Town, and Corkley), Grit.

Hazlewood-hall in Duffield, 1st Grit.

Hazlewood-lane, in Duffield, Shale Grit.

Heage (Town, and W), 5th and 4th Grit.

Higham in Shirland, 10th Grit.

Hollinwood-common W, near Brimmington, 10th Grit.

Hopping-hill in Duffield, 1st Grit.

Hopton-Wood, in Middleton by Wirksworth, by Via-Gellia Dale, 4th Lime.

Horsley N, 5th Grit?

Killis Farm (Highwood) in Horsley, coarse 3rd Grit.

Kings-Newton in Melborne, Grit, in Red Marl.

Kirk Ireton Town, coarse Shale Grit (see p. 228); and N (Copt-holly), Shale Grit.

Langley (Kirk) N, Grit, in Red Marl.

Lea-wood W (White Tor), near Cromford Bridge, Shale Grit; and S E (Knowl), 1st Grit.

Little Eaton (Common, 2 Quarries), salmon-coloured Grit, some coarse: Rail-way Branch of Derby Canal.

———— N W (Iron's Wood), 1st Grit: and near ditto W, Shale Grit.

Long Duckmanton, ¼ *m.* S E, Grit.

Macclesfield Common, Cheshire (Cliff Bank), 3rd Grit.

Mackworth, Grit, in Red Marl.

Makeney in Duffield, 1st Grit.

Mansfield, Notts (Vale in the Town), yellow, and red granular Lime; and (SW of Town), white in yellow L; and N (Chesterfield Quarry), red granular Limestone.

Matlock, Shale Grit, and 1st Grit.

Matlock Bath, Tufa, from the Hot Spring.

Melborne (Wood-houses), Grit, in Red Marl.

Mellor (Goytecliff-tor, Cheshire), 2nd Grit; and (Cobden-edge), 4th Grit.

Milford in Duffield, 1st Grit.

Morley Moor, NW of Town, salmon-coloured Grit.

Morton, ½ *m.* S, Grit.

Mossborough (Noe Hill) in Eckington, 9th Grit.

Mount Sorrel, Leicestershire, Sienite (see p. 152): by Leicester Navigation.

Nether Seal, ¼ *m.* NW, Leicestershire, Grit, in Red Marl.

New Mills in Glossop, 3rd Grit.

North Anston N, near South Anston, Yorkshire, yellow Lime.

Oneston (Hardhouse Bank) in Dronfield, 9th Grit.

Overton (Gregory) in Ashover, 1st Grit.

Oulerton, NW of Sheffield, Yorkshire (Limerick), 3rd Grit.

Packington, Leicestershire, Grit, in Red Clay.

Pentrich (Common), 11th Grit; and (Town), 12th Grit.

Pilhough, near Great Rowsley, Shale Grit.

Pott Shrigley NW, Cheshire (Nab), 4th Grit; and (Bakestone-dale), 3rd Grit.

Pudding-pie Hill, W of Brampton, 5th Grit.

Pye-bridge, near Somercotes, in Alfreton, 11th Grit.

Rainow Chapel W, Cheshire (Kerredge), 4th Grit (see p. 165).

Ravenstone, Grit, in Red Marl.

Raworth in Glossop, 4th Grit.

Renishaw E N E (Burley), 10th Grit, by Chesterfield Canal.

Repton, ¾ *m.* S E, and ⅔ *m.* W, Grit, in the Red Marl.

Revedge Hill, NW of Warslow, Staffordshire, 1st Grit.

Ridge-way, near Bull-bridge, in Duffield, 1st Grit.

Ridgeway SW (Lum-delph), in Eckington, 9th Grit, blue hearted.

Roche Abbey, N E of Laughton le Morthen, Yorkshire, white in yellow Lime (see p. 53).

Rowlee in Hope Woodlands (Crookston Tor), Shale Grit.

Sheen Hill, N of the Town, Staffordshire, 1st Grit; and S, Shale Grit.

Sheffield Park, Yorkshire (Crosland), 10th Grit; and (Manour), 11th Grit.

Shire-Oaks, near Worksop, Notts, white in yellow Lime; and S E (Lady-lee), yellow: Branch of Chesterfield Canal.

Shirland, 12th Grit.

Shirley, Grit, in Red Marl.

Shuttlewood Common (Nunnery) in Bolsover, Grit.

Simondley E, in Glossop, 2nd Grit.

Slaley SW (Wass'), in Bonsal, 4th Lime, Anomia, p. 414.

Smithsby (Pistern Hill), Grit, in Red Clay.

Snelston, ½ *m.* W, white Gravel Rock?

South Normanton, Grit.

South Winfield (Town, and Coburn), 4th Grit.

Spitewinter, near Stanage, in Ashover, 2nd Grit.

Stanage, N of Ashover, (Rocks), 3rd Grit; and (White-edge), 2nd Grit.

Stanley S, in Spondon, Grit.

Stannington S (Lydyate), in Sheffield, Yorkshire, Shale Grit.

Stanton by Bridge (N), coarse Grit; and (S E), fine Grit, in Red Clay.

Stanton by Dale E, salmon-coloured Grit, and in Town.

Stanton Moor, near Winster, 1st Grit.

Stanton Moor, near Wooton, Staffordshire, white Gravel Rock?

Stanton-ward, by Newhall, Grit.

Starkholmes in Matlock, Shale Grit.

Steetley, N E of Whitwell, white Crystallized, in yellow Lime.

Stretton (Bear), near Higham, 10th Grit.
Stretton in the Fields, Leicestersh., Grit, in Red Marl.
Sutton in Scarsdale (Owlcoats), Grit.
Swithamley, in Staffordshire, Shale Grit.
Tansley, near Matlock, 1st Grit.
Tapton S E, near Brimmington, 5th Grit.
Thorney-Ley in Chapel-en-le-Frith, Shale Grit.
Tibshelf N E (Hurst), Grit; and N (Cock-top), Grit.
Ticknall (E, in Repton P.), Grit, in Red Clay.
Upper Town in Ashover (Roches), 1st Grit, p. 222.
Walkley in Sheffield, Yorkshire (Bank), 3rd Grit.
Walton (Common) in Chesterfield, 4th Grit.
West Hallam (Town), Grit.
Weston on Trent (N W of Church), Grit, in Red Marl; and SW (Cliff), Grit, in Red Marl, by Trent and Mersey Canal.
Wetton, Staffordshire, 4th Lime.
Whittington N E (Glass-house Common), 9th Grit; and WSW (Sheep-bridge), 10th Grit.
Whitwell S (Bakestone Moor), granular yellow Lime.
Wickersley S, Yorkshire, Grit.
Willésley, $\frac{1}{4}$ *m.* S, Grit, in Red Clay.
Winco-Bank, near Sheffield, Yorkshire, 11th Grit.
Wingerworth W (Bole Hill), 4th Grit.
Winshill, near Newton Solney, Grit, in Red Marl.
Wirksworth (Gorsey-bank), Shale Grit.
Woodseats in Norton (Meadow Head), 4th Grit.
Woodthorp, near Staveley (N), 13th Grit; and (Damstead), Grit.
Worksop NW (Lady-lee), Notts, yellow Lime: Branch of Chesterfield Canal.
Yeardley in Whaley-bridge, Cheshire, 3rd Grit: Rail-way to Peak Forest Canal.

At Mansfield (Chesterfield) Quarry, Notts, above mentioned, square blocks of Building-stone are sold in the rough at 7*d.* to 8*d.* per foot cube. At Morley Moor Quarry, Ashler of various colours, from white to red, is dressed and prepared for facing common Buildings, at 1*s.* per yard super, the best kinds 2*s.* 6*d.*; blocks of Building-stone at 1*s.* per foot cube; Copeing-stones dressed, at the rate of 1*d.* per inch in width, and a yard in length. At South-Winfield Park (Coburn) Quarry, stone is hewn and prepared for Buildings at 7*d.* per foot cube, or 9*d.* for very large blocks; the charge of delivering into Boats on the Cromford Canal, 3*s.* per Ton. At Stanton Moor, Staffordshire, hewn Paving is sold at 5*d.* per foot super, and Copeing at 5*d.* per foot super. At Stanton by Bridge, lower or Bridge Quarry, rough Ashler is sold at 4½*d.* per foot cube; Copeing-stones dressed at 7*d.* to 8*d.* per foot super. At Wickersley, Yorkshire, Ashler, faced, 9*d.* to 10*d.* per foot super.

At the following places there are *Saw-Mills*, worked either by Water or Steam, for sawing Stone for the various purposes of Building, Paving, &c.

Ashford, at W end of Town (by Water).
Bonsal, S of the Town (by Water).
Goytes-clough, S of Goyte-bridge, Cheshire (by Water).
Lea Wharf, near Cromford E (by Water).
Mansfield, S of the Town (by Steam-Engine).
Nether Langwith, Notts (by Water).
Wirksworth Town (by Steam).

Respecting the Freestones of this district, it may be proper to remark, that the several Grit-stone or Sand-stone Rocks in the Coal-Measures have Argillaceous Cements (except the 1st, and the 3rd in a slight degree), and often won't stand the weather; the 4th Rock, how-

ever,

ever, generally produces a good Building-stone, when pursued to a proper depth below the surface. The stone from the yellow Limestone strata, is generally very durable, and so is that from the 4th Lime. The Shale-freestone is generally pretty durable, and in some Quarries is variegated with concentric streaks of yellow red, so as to have a pleasant effect: Chimney-pieces are sometimes worked of this stone from Callow (Hascar-side) Quarry, for the Inhabitants, who improperly call them Marble: in Sheffield I also saw some new Houses faced with it, at Portobello, from Stannington (Lydyate), there called Marble, from this variegated appearance.

Paviers, Flags or Layers;—these are flat beds of stone which naturally split up or rise in the Quarry, so plane and flat, as to serve for paving Foot-paths, Yards, Out-houses and even Dwelling-houses, with little labour, and often without any, applied to the facing of them. The following are the places where I noticed these kinds of Quarries or Delphs.

Abney in Hope, Shale Grit.
Beeley Moor, 1¼ *m.* E of Great Rowsley, 2nd Grit.
Bradway (Hempyard-lane) in Norton, 6th Grit, blue.
Brampton (Three Birches) N W, 6th Grit; and (Pudding-pie Hill) W, 5th Grit.
Brassington Common, N of Town, 4th Lime, grey.
Bredsall Moor, N N E of Town, salmon-coloured Grit.
Bugsworth in Glossop, 3rd Grit, near Peak Forest Canal.
Bull-bridge in Crich, Shale Grit, by Cromford Canal.
Calow in Chesterfield (Upper Lane), 6th Grit.
Chinley (Churn), near Chapel-en-le-Frith, 2nd Grit.
Clay-cross in North Winfield, Cank in 9th Grit, rhomboidal.

Denby, ¼ *m*. S E, and S of the Church, Cank in Grit, rhomboidal.

Dronfield N, Cank in 9th Grit.

Eckington (Marsh) WSW, 9th Grit.

Edensor S (in Park), Shale Grit.

Eyam Woodlands (Wet Wivens), Shale Grit.

Flash, S of the Town, Staffordshire, 1st Grit.

Foolow S, near Eyam, 1st Lime, Entrochi.

Fullwood SW, in Sheffield, Yorkshire (Brown-edge, and Fullwood-head), 3rd Grit.

Glossop N E (the Low, and Charles Lane), 1st Grit.

Goytes-clough, S of Goyte-bridge, Cheshire, 2nd Grit.

Grass-hill S E in Hasland, in 12th Coal Shale.

Green-hill in Norton, 6th Grit.

Grindon, 1½ *m*. N W, Staffordshire, bastard Shale Limestone.

Hansworth-Woodhouse S, Yorkshire (Purslow), 12th Grit.

Harston S, in Matlock (White Tor), Shale Grit.

Heage N E, 5th Grit.

Holm-gate in North Winfield, 6th Grit.

Kniveton N E, Shale Lime, Entrochi.

Linby, Nottinghamshire, red, in yellow Lime.

Long Duckmanton, ¼ *m*. S E, Grit.

Macclesfield Common (Tags Nose), Cheshire, 4th Grit.

Mansfield S W, Notts, yellow Lime.

Monsal-dale, near Little Longsdon, 2nd Lime, black.

Monyash N E (High Low), 1st Lime, Entrochi.

New Mills in Glossop, 3rd Grit.

Penistone SW, Yorkshire (Hartcliff), 4th Grit.

Pentrich Common NW, Grit.

Rainow Chapel W, Cheshire (Kerredge), 4th Grit.

Raworth in Glossop, 4th Grit.
South Winfield (Town, and Coburn), 4th Grit.
Stanage, N W of Wingerworth, 3rd Grit.
Stoke in Hope, Shale Grit.
Swithland, E of Charnwood Forest, Leicestershire, blue Slate. (See page 153).
Tapton S E, near Brimmington, 5th Grit.
Thornsett in Glossop, 3rd Grit.
Unthank W, near Holmsfield, 4th Grit.
Wetton N, in Staffordshire, 4th Lime, small Entrochi.
Whitfield in Glossop, 1st Grit.
Whittle (Crowther) in Glossop, 3rd Grit.
Whitwell S (Bakestone Moor), red in yellow Lime.
Wingerworth W (Bole Hill), 4th Grit.
Woodseats in Norton (Meadow Head), 4th Grit.

At Glossop Low Quarry, the Paviers are sold squared, at 12*d*. to 16*d*. per yard super. When brought down to the Town, the best are sold at 1*s*. 7*d*. per yard super; seconds 1*s*. 5*d*. and the coarsest sort at 1*s*. 3*d*. per yard. At Goytes-clough, the Paviers, drest and scowered, or smoothed on the surface, are sold at 1*s*. 6*d*. per yard super.

At the Morley Moor Quarry (p. 420), Paving of 4 to 5 inches thick is dressed, and *laid* in the neighbourhood, at 5*s*. per yard super: stout 5 inch, for Barn-Floors, 4*s*. 6*d*. per yard super.

At Kerredge Quarry, near Rainow Chapel, Cheshire, Paving 2 inches thick to 1½ inch is sold at 16*d*. per yard super. At Coburn Quarry, in South-Winfield Park, Paving 2 to 3 inches thick is sold at 20*d*. per yard super. At Stanton Moor in Staffordshire (p. 421), hewn Paving 5*d*. per foot super. At Stanton, by Bridge Quarry,

Quarry (p. 421), hewn Paving, about 5 inches thick, 7*d.* per foot super.

At Wickersley, Yorkshire (p. 422), hewn Paving 21*d.* per yard super, faced, 15*d.* unfaced.

At most of the Saw Mills mentioned above (p. 423), considerable quantities of Paving-stone are sawn from blocks of Freestone; and at the following places they have also apparatus, worked by their Mills, for scowering or smoothening, and at some for *polishing* the better kinds of Paving and Marble Slabs, viz.

St. Alkmunds, Derby, Messrs. Brown and Co. and Mr. Evans.
Ashford, Mr. Platt's.
Goytes-clough, Mr. Joseph Marchington, for Scowering Paviers.
Mansfield, S of the Town, Notts, by Steam-Engine.
Nether Langwith, Notts, Mr. John Standley, for yellow L.
Wirksworth, worked by Steam-Engine.

Among the above Quarries, furnishing natural Paviers, those of the 4th Grit Rock are the most perfect; and at South-Winfield Park (Coburn), Wingerworth (Bole-hill), Penistone (Hartcliff), Rainow Chapel (Kerredge), &c. are little, if at all, inferior to the famous Quarries at Ealand-edge and Cromel-bottom, near Halifax, in Yorkshire, on this same Rock, whence the Foot-paths in London and most of the great Towns in the South of England are now supplied, as observed page 165.

Some few beds of the Stones of this kind, are adapted for the making of *Grave-stones*, Mile-stones, Mural Sun-dials, and other articles, on which durable inscriptions require to be painted, for which many durable Stones are no ways adapted—the Swithland Slate for instance, on account of its rather repelling than imbibing the oil of the Paint; and which in consequence soon scales off entirely, and the inscription is lost, as Travellers experience to their great vexation, wherever the Swithland Mile-stones are used by the public Roads. Mr. White Watson, of Bakewell, after numerous trials and experiments, found a Pavier Grit Stone at Woodseats in Norton (in the 4th Grit Rock), in which some Calcareous Earth is combined, which possesses durability, and this property of imbibing Grease and holding Paint on its wrought surface, in an eminent degree. At Bakewell-edge and at Pilhough, near Great Rowsley, beds of the Shale Grit are found, adapted to make Grave-stones; so is the Stone at Thryberg, near Rotherham, Yorkshire: but the black Slate of Swithland, in Leicestershire, is the most extensively used for this purpose, notwithstanding the defect above mentioned.

Slates—or Tile-stones: these, in the district where the lamellar stones abound, are mostly used instead of Tiles, or blue Slates for the Houses and Buildings. At Sheffield these white and grey Slates are exclusively used, and give the Town a novel appearance to a stranger approaching it by the Mansfield Road. Most of the grey Slate of this district, abounds with Mica in minute plates, forming layers at the joints where the stone most readily parts. In numerous instances these joints are remarkably plane and smooth, but in others the surface of the Slates are waved and curled in a very regular and curious manner: these waved Slates, altho' they are seldom so light or look so well on a House as the plain ones, are nevertheless found to last, and answer the best, in many situations. The following is a List of *Slate Quarries* or Delphs, viz.

Abney in Hope, Shale Grit.
Ash-gate in Brampton, 7th Grit (waved).
Bakewell, E of the Town (Edge), Shale Grit.
Bradwell, 1 *m* E, Shale Grit.
Brampton NW (Three Birches, and Grange Bar), 6th Grit: and W (Pudding-pie Hill), 5th Grit.
Bugsworth in Glossop, 3rd Grit.
Bull-bridge S of Crich, Shale Grit: by Cromford Canal.
Calow in Chesterfield, Grit.
Chinley (Churn), near Chapel-en-le-Frith, 2nd Grit: Peak Forest Rail-way near.
Chunall in Glossop, 1st Grit.
Dronfield S (Hallows), 9th Grit.
Eyam Woodlands (Wet Wivens), Shale Grit.
Flash S, Staffordshire, 1st Grit.
Fullwood SW, in Sheffield, Yorkshire (Brown-edge, and Fullwood-head), 3rd Grit.
Gleedless, S S E of Sheffield, Yorkshire, 8th Grit.
Glossop N E (Low, and Charles Lane), 1st Grit.
Goytes-clough, S of Goyte-bridge, Cheshire, 2nd Grit.
Grindon NW, Staffordshire, bastard Shale Limestone.
Hanley in North Winfield, 4th Grit.
Harston S, in Matlock (White Tor), Shale Grit.
Hathersage E (Cam Height), Shale Grit.
Hayfield (White Knowl), Shale Grit.
Heage N E, 5th Grit.
Loco-lane S, in North Winfield, Grit.
Longnor, ½ *m*. NW, Staffordshire, Shale Grit.

Macclesfield Common (Tags Nose), Cheshire, 4th Grit.
Mansfield SW, Notts, yellow Lime.
Matlock W, 1st Grit.
Nether Padley N E (S of the Robin Hood), 2nd Grit.
New Mills in Glossop, 3rd Grit.
Penistone SW, Yorkshire (Hartcliff), 4th Grit.
Pentrich Common NW, Grit.
Pott Shrigley N E (Bakestone-dale), Cheshire, 3rd Grit.
Rainow Chapel, Cheshire, N (Brown Brow), 3rd Grit; and W (Kerredge), 4th Grit.
Raworth in Glossop, 4th Grit.
Stanage, NW of Wingerworth, 3rd Grit.
Stoke in Hope, Shale Grit.
Sutton in Scarsdale W (Wood-Nook Lane), 11th Grit?
Swithland, E of Charnwood Forest, Leicestershire, blue Slate. (See page 153).
Tansley SW, in Matlock, 1st Grit.
Tapton SE, near Brimmington, 5th Grit.
Thornsett in Glossop, 3rd Grit.
Unthank W, near Holmsfield, 4th Grit.
Walton WSW, in Chesterfield (Slate-pit Dale), 4th Grit.
Whitfield in Glossop, 1st Grit.
Whittington N (Swineslait), 9th Grit (waved).
Whittle in Glossop (Crowther), 3rd Grit.
Wincle Chapel N E, Cheshire (Dane-head, and Black-clough), 3rd Grit.

At Glossop (Low) Quarry, Slate is sold, in quantity sufficient to do a rood of Slating, or 44 square yards, at 52*s.*: in the Town, the same sell at 64*s.*: at Goytes-clough Quarry, Cheshire, 60*s.* per Rood.

At Coburn Quarry, in South-Winfield Park, a strong sort of *Eaves-Slates* for thatched Buildings, near a yard high, are sold at 1*s*. per yard run. At Mansfield (Chesterfield) Quarry, Notts, a sort of Eaves-Slates, 20 to 24 inches high, are prepared for tiled Buildings.

Some thin lamellar Grit-stones of this class, which are found capable of withstanding high degrees of Heat, without melting or falling to pieces, are formed into round plates about an inch thick, and 9 or 10 inches diameter, called *Pye-stones*, Pot-stones, or Lump-stones, and are sold to the Iron Forges for heating their Balls of scraps upon, for the Tilt Hammer: these are prepared at the Quarries, in Bradfield, Yorkshire NNE (Spout-house), and (Swathwick) from the 1st Grit: in Brimmington W (Wildens Mill), 8th Grit; Stanage NW of Wingerworth, 3rd Grit; Walkley in Sheffield, Yorkshire (Bank), 3rd Grit; and Whittington W (near Sheep-bridge), 9th Grit, &c.

Larger stones of the same nature are also prepared, for the purpose of baking Oat Cakes upon, called *Bake-stones*, which are either thin and round to be used on a hanging Trevet, from the Pot-hook over the Fire, as is common in the Cottages; or larger and square, for setting on the top of a Stove, similar to an Ironing Stove in the South of England. Bake-stones are made in Ashover, Beeley, Birchover (Moor) near Winster, Rowlee S (Crookston Peat-Pits), &c. At the last mentioned place, the round Bake-stones are hewn out of small loose blocks of the 1st Grit, laying at bottom of the Peat.

At Coburn Quarry, in South-Winfield Park, *Ridging-stones*, a substitute for Ridge-Tiles, are prepared; they are sawn out like an angular trough, which usually spans 11 inches, and are sold at 20*d*. per yard run. At Pentrich Common Quarry, similar ones are prepared.

10 to 40 Ale Gallons content, are sold at 5½*d*. per gallon, and all above or under those sizes at 6*d*. per gallon: at the N Quarry on the Common, small Cisterns are sold at 5*d*., and large at 6*d*. per gallon.

At Chesterfield Quarry, near Mansfield, Notts, under 20 gallons at 5*d*., above 20 gallons at 4*d*.: from this Quarry some Cisterns of 4 and 500 gallons content are sent. At Harthill in Yorkshire, 4 to 400 gallons, at 4*d*. per gallon.

At Morley-Moor Quarry, under 7 gallons at 7*d*. per gallon, 7 to 300 gallons at 6*d*. per gallon.

At Stanton Moor Quarry, near Wooton, Staffordshire, from 20 to 100 gallons at 5*d*. per gallon, 100 to 600 gallons at 4½*d*. per gallon: and Troughs 12 inches wide, 12 long, and 6 inches deep, at 2*s*. each, for Pigs. At Wickersley 30 to 150 gallons at 4*d*. per gallon, well wrought, round or square, or of any shape ordered, to fit corners where they are to stand.

Shallow Cisterns neatly hewn and roughly polished or scowered inside, of the Swithland Slate, are in great repute for *Milk-Vessels*, on account of their resistance to grease, and the great ease with which they are kept clean and sweet; and such are also used as *Salting-Troughs*, for curing of Bacon, Hams, &c.; and at Quorndon in Leicestershire and other places, thin slabs of this Slate are cemented together at the angles, so as to make large and light Cisterns, for stowing and preserving Pickled Pork and various other moist articles.

A particular bed of the 1st Grit Rock, is found porous, at Stanton in the Peak and at Birchover, on Stanton Moor, and adapted to the making of *Filtering Cisterns*, for cleansing of turbid water.

At North Anston Quarry, and at Pecks-Mill (or Dog-Kennel) Quarry, near South Anston, Yorkshire, large Rolling or *Edge Stones* for the crushing of Rape-seed, Linseed, making of Gunpowder, &c. are prepared, some of which weigh 6 or 8 Tons; from the latter Quarry they are loaded at once into Boats on the Chesterfield Canal, by which they are conveyed into the Trent, and shipt at Stockwith.

The Grit-stone Rocks, interposed between the Coal-measures of this district, several of them contain beds of uniform and sharp Grit, whose cement, though hard and firm, does not fill the interstices between the particles or grains of Silex, and such are used for the making of *Grindstones*, for the use of the Cutlers and Edge-tool Makers and the workers in polished Steel, as Saws, Fenders, Stove-fronts, &c. as well as for the grinding of edged Tools, in all the south-east part of England, where no such kind of stone is found: Grindstones therefore form a considerable export by the Canals of Derbyshire: of late there has been a great demand for the very large and coarse Grindstones made at Gregory Quarry in Overton, from the 1st Grit Rock, they are made from 4 feet 9 inches to 6 feet diameter, and 12 to 19 inches thick; one stone conveyed to the Wharf at Cromford, was 6 feet 2 inches diameter and 19¾ inches thick: 15 solid feet of them is reckoned to the Ton. The smaller of these stones from Gregory Quarry, are for grinding of Files, and the larger for grinding of Musket Barrels.

The following are the Quarries where *Grindstones* are made, and the kinds of Grit at each, viz.

Ashover NW (Hill Quarry), 2nd Grit, middling coarse.
Barnsley S E, Yorkshire (Wokes), middling.
Beeley S E (Moor), 1st Grit, coarse.
Belper S E (Hunger-hill), 3rd Grit, fine.

Biddulph Hall, N W of Leek, Staffordshire, coarse.
Bolsover N W (Nunnery), on Shuttlewood Common, middling.
Bradway in Norton (Hempyard-lane), 6th Grit, Whitening.
Bredsall N N E (Moor), salmon-coloured, middling.
Brincliff-Edge, SW of Sheffield, Yorkshire, 4th Grit, Whitening.
Buxton NW (Corbar), Shale Grit, fine.
Darley E (Moor), 1st Grit, coarse.
Glossop E (near Moss-lee), 1st Grit, coarse.
Harthill S E, Yorkshire, salmon-coloured, fine.
Hooton-Roberts W, near Rotherham, Yorkshire, middling.
Horsley, N of Derby, middling.
Lane-Top, N of Sheffield, Yorkshire, Whitening.
Little-Eaton N E (Common), salmon-coloured, middling; and NW (Iron's Wood) 1st Grit, coarse.
Milford, S of Belper, 1st Grit, coarse.
Mole-copt Hill, S of Congleton, Cheshire, coarse Grit, of the upper Coal Series.
Morley N W (Moor) salmon-coloured, middling.
Overton S W, in Ashover (Gregory), 1st Grit, coarse, large.
Polesworth, S E of Tamworth, Warwickshire.
Ridgeway SW, in Eckington (Lum-delph), 7th Grit, middling.
Stanley S, in Spondon, fine.
Stanton by Dale E, middling.
Stanton in the Peak N (Moor), near Winster, 1st Grit, coarse.
Thryberg S, near Rotherham, Yorkshire, middling.
Treton NW, Yorkshire (Bole Hill), salmon-coloured, middling.

Waverton (or Warton), E of Tamworth, Warwickshire.

Wickersley S, near Rotherham, Yorkshire, middling.

At Harthill Quarry, Grindstones 3 feet diameter, are sold at 11*s*. each. At Morley-Moor Quarry, from 18 inches to 4 feet diameter, at 40*s*. per Ton. At Wickersley Quarry, Grindstones 3 inches to 14 inches diameter, are sold at 4*d*. each; 36 inches at 3*s*. 6*d*.; 3 feet 4 inches at 5*s*.; 3 feet 8 inches at 6*s*. 6*d*.; 4 feet at 8*s*.; 4 feet 2 inches at 9*s*. 6*d*.; 4 feet 4 inches at 11*s*. 3*d*.; and thence up to 5 feet is 8*d*. per inch advance; from 5 feet to 5½ feet, 10*d*. per inch advance; from 5½ to 6 feet, 12*d*. per inch advance; from 6 feet to 6½ feet, 18*d*. per inch advance; and from 6½ to 7 feet diameter, an advance of 2*s*. 6*d*. on each inch in diameter: very few larger stones than 7 feet are made. The Wickersley stones are reputed at Sheffield, not to heat the tools so much as most other Grindstones do. The *Whitening* Stones mentioned in the above List, are used for polishing Goods, after the coarser stones have been used; some of these are of a blue, or blue and grey streaky stone, called ribbony, with a very fine Grit, found in the Coal-measures.

Some particular beds in the Rocks of this district, are of the kind of Grit used for Rubbers, or coarse Whetstones for sharpening of Scythes; of which, considerable quantities are made within a few miles N E of Derby, and sent into the Southern Counties: at the following Quarries *Scythe-Stone* are made, viz.

Belper, ½ *m*. S E (Hunger-hill), 3rd Grit.
Birchover N E, near Winster (Moor), 1st Grit.
Bredsall N (Moor), salmon-coloured Grit.

Coxbench, near Horsley.
Darley E (Moor), 2nd Grit.
Duffield N E (Bank), 1st Grit; and N, Shale Grit, formerly.
Harthill S E, Yorkshire, salmon-coloured Grit.
Heage N, 6th Grit: see Dr. Woodward's Catal. I. 17.
Holbrook SW (Dey-park), 3rd Grit.
Horsley.
Little-Eaton N E (Common, N Pit), salmon-coloured Grit.
Melborne.
Morley N W (Moor), salmon-coloured Grit.

The Scythe-stone mentioned in Dr. Woodward's Catalogue of Fossils, vol. I. p. 18, from Spondon, must I think have been a mistake.

The dexterity displayed, in cleaving out and forming the Scythe-stones, the process of which I examined in Morley-Moor Quarries, is rather surprising. The workmen use very sharp-pointed Picks, which require sharpening every quarter of an hour, and a number of very small Wedges and a Hammer. A proper block of stone being selected, two or three of these small Wedges are set in in a row, by gentle blows of the Hammer, which are successively repeated, until the stone splits in two, by a straight and plane joint; the Wedges are then set into this new face in a straight line, and the stone cleaved again; a race or nick being first scratched with the point of the Pick, where the Wedges are to enter, when the pieces grow slender, and in this way the subdivisions are continued, until a piece remains, large enough to make two Scythe-stones, each 1¼ inch square, and 11 or 12 inches long; this stone the workman holds nearly upright in his left hand, and with the point of his Pick, races a deep nick down the middle of first one side and then the other, and then by a slight blow with the point of his Pick in the nick, it is separated into two rough Scythe-stones, which is so dexterously performed, that seldom more than three or four are broken in the 120, in cleaving. Those intended for round Rubbers are then reduced to an octagon nearly, by the point of the Pick, and are then handed over to women and boys, who grind or rub them with water in a notch in a hard stone, until quite round: the square ones are ground in like manner on a flat stone, and have their arriss taken off, and the ends ground flat and to the proper length; when they are sold at 10*s*. per long hundred (120): and the same at Little-Eaton Common.

At Harthill Quarry, Yorkshire, they are made 11 inches long, and sold, the square ones at 10*s*. and the round ones at 12*s*. per hundred (122).

At Alton in Ashover, considerable numbers of *Scythe-sticks* used formerly to be made, by collecting the sharp Sand from the decomposed surface of the 3rd Rock, and glueing it on to flat pieces of Wood with a handle at the end: these kinds of sticks for sharpening of Scythes, are now made or covered with coarse Emery powder, at Melborne, in the South of the County.

Whetstones, of a close fine and sharp Grit, are procured from different Strata in this district, viz.

Alton E, in Ashover (Briton-wood), in 4th Grit.
Bolsover N W (Nunnery), on Shuttlewood Common.
Charnwood Forest, Leicestershire (Whittle Hill), blue Slate Rubble, in Sandy Alluvium. See p. 61.
Codnor Park, near Golden Valley, a thin bed of Ironstone in the Whetstone Rake.

Heage N, in 6th Grit.
Pentrich Common, NW of the Town, in 11th Grit, blue.
Sandy-brook N, near Ashburne (Heath's Dumble).
Woodthorp, near Wingerworth, a thin bed of Ironstone in the black Shale Rake.

The more compact and fine specimens of the Ironstone from Codnor-park and Woodthorp, above mentioned, are called *Hones*, and are used to set a fine edge on Knives, &c. The Heage Whetstones are used by the Petrification-workers of Buxton, Castleton, &c. for grinding the Fluor and other Spar Ornaments, when in the lathe, after they are roughed out by the chisel.

CANK Stones.—By this term the Miners, Quarrymen, and Masons generally mean, any unusually hard, compact, and brittle stone, which they meet with, which won't cut or work readily with their tools; they are what in some places the workmen call flinty stones or beds, and seem to me to answer a good deal to the Whin-stones of Scotland, a term which, like the Cank of this district, seems to be applied to very different species of stones. The Canks are generally, only thin beds, and are not very abundant in the strata, and on account of their superior fitness for repairing Roads, to any other stone found in the Coal Districts here, or in the great Shale Districts, they are eagerly sought after in some places, and ought to be more generally so, where the Grit-stones are soft and argillaceous, and with which they must otherwise repair the Roads. In describing the products of the great or Limestone Shale, I have (at page 229) given a List of the Places where

Cank Beds are known in the Shale Grit, such having in general much the appearance of what is called bastard Limestone, or so abounding with Silex, as to have little or no value as Limestone: and probably the Canks of the Coal Districts, of which I am now speaking, may contain more calcareous matter than is usually met with in these strata: the following are places in the Coal Districts where *Canks* are dug, viz.

Alfreton, 1 *m*. N, by the Shirland Road E (rhomboidal).
Bradway W, in Norton, in 6th Coal-shale?
Brinsley, Notts, Town; and Windmill-hill, ½ *m*. S E.
Clay-cross W, in North Winfield, in 9th Grit (rhom.).
Denby, ½ *m*. S E, and S; and in Roby west-field Colliery, Grit.
Dronfield N, in 9th Grit.
Eccleshall-Barlow, in Sheffield, Yorkshire, S E (Button Hill); N (Greysitch), in 3rd Coal-shale.
Pentrich, ½ *m*. SW, Grit.
Stanton Ward, S E of Toll-Bar near Newhall, Grit.
Swanwick Delves, S S E of Alfreton, Grit.
Tapton S E, near Brimmington, in 5th Grit.
Tibshelf W (Nether Moor), Grit.
Walton Common, in Chesterfield, in 5th Grit?
Woodseats in Norton, in 3rd Coal-shale.

It seems probable, that most of the above beds of Canky Stone are only local, and that in many places, stone of the ordinary qualities will be found in the place of them in the series of strata, but the subject is worthy of a more minute attention than I have yet been able to bestow on it: the Canks are in general very durable, as well as hard.

Quartz Crystals.—In speaking of the Gravels of this District, page 134, I have already mentioned the vast multitudes of rounded fragments of crystallized Quartz, which have been transported from some foreign region, and scattered on many parts of the surface of the Derbyshire Strata: the very numerous Grit-stone Rocks and Stone-beds which abound in this District, with the exception perhaps of some parts of the Gravel Rocks, are also composed of semi-transparent grains of Quartz or imperfect Crystals of that substance, and not of particles of such Quartz, rounded by attrition, as has often been asserted; these grains, exactly of similar shapes, are found of all sizes from ¼ inch diameter (see page 179) to the most minute grains, which the eye unassisted by glasses can perceive, in the Grit-stones, and from which it is not difficult to detach them for observation, few of their cementing matters bearing any proportion to the hardness of these silicious grains.

In Allen's and Fall-hill Lime Quarries at Mill-town in Ashover, cavities or tick-holes are found very frequently, in the 1st Lime Rock, which are lined with hexagonal pyramidical Quartz Crystals, of a light waxen colour: and I heard of similar but more rare occurrences, in the 1st Lime in Matlock, and in the 2nd Lime in Tideswell.

Small detached and perfect Crystals of colourless Quartz, called by some, Derbyshire *Diamonds*, consisting of an hexagonal prism terminated by pyramids, with others of a light rose colour (see Mawe's "Mineralogy of Derbyshire," p. 85), are found occasionally in the following places, viz.

Bakewell, NW, imbedded in 1st Toadstone.

Brassington Common, loose in Corn Soil, on 4th Lime.

Buxton S (Sherbrook), imbedded in 3rd Toadstone: SW (Counters Cliff, and Grindon), loose in Peaty Soil, on 4th Lime.

Castleton NW (Tra-cliff Hill), loose in the Corn Soil.

Gateham W (Wetton Pasture), Staffordshire, in reddish Soil, on 4th Lime.

Millers Dale SW (Long-lane), near Priestcliff, imbedded in 3rd Toadstone, in great numbers.

It is not uncommon, to find small specimens of *Calcedony*, *Hornblend*, *Jasper*, *Zeolite* and *Terra-Vert*, particularly the latter, imbedded in the 3rd Toadstone, and perhaps also in the 2nd and 1st Toadstones of this district, in which last, *Onyxes* are also said to be found, NW of Bakewell: but as these are matters rather curious than important, in this place, I shall, after mentioning that there are in St. Peters, Derby, two *Lapidaries*, who cut and polish hard and precious stones, pass on to my last division of Mineral Substances, viz.

3rd, Earths, &c.

Shale.—Under this Name, or Blaes, Shiver, &c. are comprehended a large class of Argillaceous Strata, common in all the Coal Districts, as observed page 161 and 181, and also a very thick stratum next above the Mineral Limestone Strata, page 227. It is not uncommon with Colliers, to call any Argillaceous Stratum in very thin lamina, by the name of Shale, but it seems to me desirable, to confine that term, except when used as a general Name for the Argillaceous and other Strata between the thick Grit Rocks of the Coal-Measures (see page 169), to such thin lamellar Strata, as do not on exposure to the air, wet and frosts, fall to a perfect or plastic Clay, but, for a very considerable time at least, preserve their lamellar texture, though in less and less plates, according to the length and degree of exposure; and to denominate all such lamellar Argillites as fall perfectly, *Binds*, or *Clunches*, which will next be mentioned. The Shales of Derbyshire vary in colour, from perfect black to brown, and light yellow in some few instances, they often have ochrey joints, and produce very ochrey Springs of Water: very frequently they contain balls, and sometimes thin strata of Argillaceous Ironstone, and generally have coaly impressions of Vegetables in them: Muscelites and Anomia Shells are sometimes found in Shale, but not commonly.

The only use to which I saw Shale applied in Derbyshire, is the making of *Bakestones*, from a particular kind, which is dug in Bakestone Clough, 1½ *m*, S E of Whitfield in Glossop, from the upper part of the Limestone Shale, of a dark grey colour, in large fleaks or thin strata, which are at first so soft, as to be easily shaved by a drawing-knife to the proper shape and size: a fire is then made, and these soft stones are set up on edge round it, to "beal," that is, dry or anneal them: after which they are sold to the Cottagers for baking their Oat Cakes upon, see page 431: these Bakestones of natural Pottery, of 15 or 16 inches diameter and about ¾ of an inch thick, sell at 1*s*.; larger ones, to set upon a stove 3 feet long and 22 inches broad, at 5*s*. 6*d*., at the Quarry, when annealed. The decomposed Limestone Shale often forms a Clay on the surface, which is applied to the making of Bricks at Ashburne, Leek E, in Staffordshire, Turnditch SW, &c.

Bind.—A numerous class of perishable argillaceous lamellar Strata, are found in most of the Coal Districts, in what I have denominated the Coal-shales, in describing these Strata in page 162. The Binds, generally speaking, may be considered as indurated Loam, or natural mixtures of Sand and Clay, in hard lamina, which perish and fall to a loamy Earth on exposure to the air, wet and frosts, however hard such may appear, when fresh dug: when the Clay greatly abounds, these pass into Clunch, which will next be noticed, and when the Sand much abounds and the degree of induration is considerable, these are denominated Stone-Bind, which often has the appearance of Grit-stone when fresh dug, and generally contain minute plates of Mica, but won't endure exposure: the Sand-stone of the Newcastle on Tyne Collieries seems to me from its description, to answer to the Stone-Bind of Derbyshire. Binds occur of various colours, as black, blue, brown, yellow, grey, &c. and often contain balls and layers of Ironstone, and vegetable impressions.

Some thin strata of hard black Bind, which occur in the Derbyshire Coal-measures, are used as *Black Chalk* by Stone-Masons and others; these I noticed in Alfreton, Aston (Pidgeon Bridge) in Yorkshire, Butterley (Tunnel), Stanfrey, &c.

The decomposed Binds and Clunches of the Coal-Measures make good *Brick Clay* in various places; I noticed them thus applied, in

Alderwasley, SW.
Alfreton.
Belper (Cow-hill); and S of the Town.
Brinsley, Notts.
Chesterfield.
Heanor.
Ilkeston.
Measham.
Morley.
Openwood-gate in Denby.
Sheffield, Yorkshire.
Smalley.
Somercotes.
Stapleford, Notts.
Toad-hole-Furnace in Shirland.
Whiston, near Caldon, Staff.
Wirksworth, ½ m. E (Moor), &c.

Some of the Binds in the Coal-measures are calcareous, in a considerable degree, and have been found highly useful as *Marl*, in some instances, where accident or design has led to the trial of them by the Farmer, as at Boythorp by Mr. W. B. Thomas, (Agricultural Magazine, II. 284), at Calow E of Chesterfield by Mr. Read Denham from the top of the 5th Coal Shale, at Hasland, at Heanor, at Ripley, at Smalley by Mr. John Radford, at Stretton from Smithy-moor Coal-Pits, in 9th Coal Shale: at Belmont in Ipstone Staffordshire, by John Sneyd, Esq. from near the top of the 1st Coal Shale:—on the E of Oak-Moor Mills, near Alveton, Staffordshire; on the E side of Makeney in Duffield, and in other places, I noticed the appearance of Marl in the 1st Coal Shale. I lament that the unfinished state of my observations on the Coal Districts, leaves it doubtful, from what particular Strata some of the Marley Binds above alluded to were taken, which might prove of considerable importance to these Districts, where Lime is very far to fetch, in pointing out the probable places where these calcareous Binds could be met with on the surface, and where Marl-Pits might perhaps be opened upon their basset-edges.

CLUNCH,—is the usual appellation with the Colliers of this District, for indurated Clay, particularly those infusible sorts, which are adapted to the making of Fire-Bricks; these Clunches are found of various colours, as black, grey, yellow, white, &c. and with very different degrees of hardness: it has been remarked, p. 179, that a Clunch is generally found beneath each seam or stratum of Coals, and such are always at their basset-edges, decomposed into Clay, of which I shall next speak.

CLAY.—The strata of proper Clay which occur in Derbyshire, are rather rare, and of no great thickness, though a considerable portion of the Argillaceous Gritstones, Shales, Binds, and Clunches, and the Toadstones, of which I have spoken above and at pages 161 and 278, by decomposing or perishing at their edges, have produced Clayey Soils of very considerable extent, exclusive of the red clayey surfaces of the Red Marl Strata, which have been described page 110, and of Red Clayey Strata nearly resembling these, which occur in the Coal-measures about Ashby-de-la-Zouch, and of alluvial patches of Clay, as severally mentioned in Section 4, of this Chapter, when speaking of Clay Soils, page 303; some small quantities of Clay also occur in Veins and Lums in the Limestone Rocks, the 4th in particular.

The Clays of Derbyshire are applied to the making of China, Pipes (Tobacco), Pottery, Fire-bricks, Tiles and Bricks, and to the Marling of Land, &c. of which I intend to speak in order, viz.

CHINA-CLAY, of a most beautiful white colour, is procured in small quantities, in Bald-mare, Greenlinnet, Suckstone, and Upper-field Mines, in the 4th Lime, in Brassington, in Clay-pit-dale Mine in Hartington, &c.; in a Lum or fissure in the 4th Lime, ¼ *m.* E of Newhaven House, also in a similar Lum at Milkhill-Gate, 1¼ *m.* E of Caldon, in Staffordshire, and perhaps in other places, on this same stratum. At Pinxton, and in St. Alkmund, Derby, there are *China Factories*, which will be noticed in Section 8, of Chap. XVI. At Pinxton, St. Michael, Derby, King's Mills in Castle Donnington, and Cunsal near Kingsley, Staffordshire, there are *Flint-Mills*, Kilns, &c. for preparing

ing Glazing for the China Factories and White Potteries; the Flints are brought by the Canals from the Chalk Districts.

Pipe-Clay, a white and pure Clay, but inferior to the above, is procured in Bolsover, from beneath the yellow Lime, from Gander-lane in Killamarsh, in the 13th Coal-shale? in Hartshorn, 1 *m.* N E in the Coal-measures; ¾ *m.* E of Newhaven-House, in a Lum in the 4th Limestone: some lumps of it also occur in the alluvial Clay on Chellaston Hill, S E of the Town, &c. In Allsaints and in St. Werburg, Derby, in Bolsover, and at New Brampton near Chesterfield, there are Manufactories of *Tobacco Pipes*.

Potters' Clay, whitish, yellow, and red of various hues, are found in the Coal-measures of Derbyshire and near it, and are applied to the making of Pottery, Earthen and Stone-wares of various kinds: the places where I noticed such Clay-Pits are,

Attercliff-common, near Sheffield, Yorkshire, in 12th Coal-shale?
Belper-gutter, in Belper, in 2nd Coal-shale.
Cadhouse-Lane in Ticknall, in Coal-measures.
Chesterfield W, in 9th Coal-shale.
Church-Gresley Common, in Coal-measures.
Crich NE, in 2nd and 3rd Coal-shale.
Hartshorn, 1 *m.* NE; and SW at Wooden Box, in Coal-measures.
Heage, Nether-end, 3rd in Coal-shale.
Horsley, in Coal-shale.
Ipstone W, Staffordshire, in 1st Coal-shale?
Milk-hill on Ashby Wolds, Leicestershire, in Coal-measures.

Morley-moor, in Coal-shale.
Newbold W and N, in Chesterfield, in 9th and 10th Coal-shales.
New Brampton, near Chesterfield, in 9th Coal-shale.
Pinxton, in Coal-shale.
Smalley Common, in Coal-shale.
Smithy-houses in Denby, in Coal-shale.
Stanage in Ashover, in 2nd Coal-shale.
Stubbing, near Wingerworth, in 2nd Coal-shale.
Swinton, N of Rotherham, Yorkshire, in Coal-shale.
Ticknall S, in Coal-shale.
Wessington in Crich, in 3rd Coal-shale.
Wheatcroft in Crich, in 2nd Coal-shale; and S E (Moorwood), in 3rd Coal-shale.
White-moor, near Belper, in 2nd Coal-shale.

The *Potteries*, or Manufactories of Earthen or Stone Ware, where these Clays are used, are situate at

Alfreton Town, red Ware.
Ashby-de-la-Zouch, Leicestershire ; and on the Wolds, white and yellow Ware.
Belper-gutter, near Belper, 2 for Stone Ware, Bottles, Pitchers, &c.
Chesterfield, white earthen, and brown and red Ware, large Water-pipes for Gateways, Drains, &c.
Church Gresley, 4 for white, yellow, and red Ware.
Eckington, on the Marsh, formerly.
Hartshorn, W, at Midway-houses; and SW at Wooden-box.
Ilkeston E, by the Erewash Canal.
Newbold (near Chesterfield), N N E and N E, on the Race-common.
New or Little Brampton, near Chesterfield.

Smalley Common, Water-pipes, and Cylinders for arched, fire-proof Ceilings.
Swadlingcote, in Church Gresley, white and yellow.
Ticknall, 2 for red Ware.
Whittington, red.

Chimney-Pots, *Garden-Pots*, and various other useful and common articles of coarse Pottery, are made at several of the above Potteries, and *Pancheons*, or shallow red glazed Pans for setting of Milk in Dairies, in great numbers.

FIRE-CLAY.—The infusible nature of the Clays which are found under the Coal-seams in this district, have been mentioned already, page 180; this is particularly observable in the 2nd and 3rd Coal-shales, or those Clays laying between the 2nd and 4th Grit Rocks, which are in high repute, not only for making Bricks to line Iron Furnaces, and others where the most intense and long continued heats are required, but also when tempered like Mortar, to be used in setting Fire-Bricks and Stones, in the linings of Furnaces, making coarse Crucibles, and Saggers for the China Factories, &c. At the following places I noticed *Pits of Fire-Clay*, viz.

Belper-gutter, near Belper, in 2nd Coal shale.
Birkin-lane in Ashover, in 3rd Coal-shale.
Church Gresley Common, in Coal-shale.
Crooks-moor, W of Sheffield, Yorksh., in 3rd Coal-shale.
Dore in Dronfield, in 2nd Coal-shale.
Gander-lane in Killamarsh, in 13th Coal-shale?
Heage Nether-end, in 3rd Coal-shale.
Holmsfield in Dronfield, in 3rd Coal-shale.

Measham, in Coal-shale.

Midhope-stones, in Ecclesfield, Yorkshire, in 2nd Coal-shale.

Milk-hill, on Ashby Wolds, Leicestershire, in Coal-shale.

Milkhill-Gate, 1¼ *m.* E of Caldon, Staffordshire, alluvial, in a Lum of 4th Lime.

Newhaven, ¼ *m.* N E, in Hartington, ditto.

Openwood-gate in Horsley, in 3rd Coal-shale.

Pennyford, S of Congleton, Cheshire, in Coal-shale.

Shuttlewood-common in Bolsover, in Coal-shale.

Stanage in Ashover, in 2nd Coal-shale.

Swadlingcote in Church Gresley, in Coal-shale.

Totley in Dronfield, in 2nd Coal-shale.

Wheatcroft in Crich, in 2nd Coal-shale.

Wooden-box in Hartshorn, in Coal-shale.

At Birkin-lane, Shuttlewood-common, Crooks-moor, and Swadlingcote, *Fire-Bricks* are manufactured for sale, and are in great repute: such are also made at Dore, Gander-lane, Holmsfield, Midhope-stones, Pennyford, and Totley. At Swadlingcote, Arch-Bricks, proper for the tops of Reverbatory Furnaces, are made, vulgarly called Velvetory Bricks: here also are made round Tiles, for the use of the Bar-Iron makers, to heat their lumps or Balls of scraps upon, instead of using the Pot or Pye-stones made of Firestone, which are mentioned page 431.

Tile and Brick Clay.—In speaking of the withered or decomposed edges of the Shales and Binds in the Coal-measures (page 445), I have mentioned several places where Clays fit for the Tile and Brick-makers' uses, are so produced: it remains here to notice, some of the Brick-Kilns upon the regular Clays and Clunches of these Coal Series, viz.

Ashby-de la-Zouch W, Leicestershire.
Belper-gutter in Belper.
Birkin-lane in Ashover.
Brook Houses W, near Cheadle, Staffordshire.
Church Gresley Common.
Clifton S, in Ashburne.
Gander-lane in Killamarsh.
Hartshorn, N E, and W.
Measham.
Melborne.
Milk-hill, in Ashby Wolds, Leicestershire.
Stapleford N E, Nottinghamshire.
Swadlingcote in Church Gresley.
Ticknall S.
&c.

At Cinder Hill, near Basford, in Nottinghamshire, Bricks seem made from the blue Clay beds in the yellow Lime, see page 157.

The Alluvial Clays, which are noticed in page 133, and in the List page 134, are in many places capable, by a separation of the stones and extraneous matters, of being converted into Bricks: I noticed Pits and Kilns of this kind at

Bolsover, 1¼ *m*. E of the Town.
Leek, 2 *m*. SW, Staffordshire.
Newhaven, 1*m*. S S E, in Hartington.
Roston E S E, on the Common.
Sheffield N (Philadelphia), Yorkshire.
Skegby, S E of the Town, in Notts.
Spondon Common, N E of the Town.
Thorpe-Salvin, Yorkshire, N E of the Town.
Turnditch, S of the Town.
&c.

In other situations, Bricks and Tiles are also made, as before observed, page 148, from the more tenacious beds, or the decomposed surface, of the Red Marl Strata: these Kilns I noticed, in

Appleby.
Burton on Trent, S of the Bridge.
Derby.
Longford.
Mickleover
Newton Solney S.
Snareston, Leicestershire.
Stapenhill, 7 Kilns.
Uttoxeter N, Staffordshire.
&c.

In the Pottery District of Staffordshire, a kind of plane *Tiles* for Buildings are manufactured, which have a very dark dull purple colour, very like new Cast Iron; they are made with two projecting nobs at the upper end to catch on the laths, instead of holes and wooden Pins, as is usual in other Districts; these Tiles, from their neatness, somewhat resembling Slate, and being very sound and durable, are in great repute in the southern parts of Derbyshire, to which they are brought by the Trent and Mersey and other Canals; at the Canal Wharf in Derby, these Tiles are sold at 50*s*. per Thousand, and are called Burslem, Handley, or Newcastle Tiles: an attempt was lately made to imitate these black Tiles at Milk-hill near Wooden-box, on Ashby Wolds, Leicestershire, but without success: South of Harboro Rocks in Brassington, the whitish Clay of the decomposition of the 3rd Toadstone (see p. 279), is said to burn blue, and to be capable of making Tiles, much like the above in quality.

Since Draining of Land has been so much practised in Derbyshire, stout curved Tiles, like Ridge Tiles, and hollow or Pipe Bricks, having a half cylindrical notch on them, so that two of these form a hollow cylinder or pipe, are made at several of the Brick-Kilns. I noticed the manufacture of these *Draining Tiles* and *Pipe-Bricks* at the following places, viz.

Burton on Trent, S of the Bridge, Pipe-Bricks.
Clifton S, in Ashburne, Drain-Tiles.
Longford, Bricks.
Mickleover, Tiles.
Newton Solney S, Bricks and Tiles.
Snareston, Leicestershire, improved Tiles.
Stapenhill, Bricks and Tiles.

Stapleford N E, Nottinghamshire, improved Tiles.
Uttoxeter N, Staffordshire, Bricks and Tiles.
Wirksworth, ½ m. E (Common), improved Bricks.

The Drain-Tiles are now, I understand, allowed to be made Duty-free at the Kilns, without any holes being made through them, to disfigure or spoil them for other uses, to which it was pretended that they *might* be applied, and which weakened the Tiles, and occasioned many of them to break in carriage, and in laying in the Drains.

At Clifton, the Tiles 12 inches long, and about 8 inches wide and high, sell at 1½*d* each; the labour on them costing 1*d*. On the S of Newton Solney, Drain-Tiles are 20*s*. per 100; drain Pipe-Bricks, 9 inches long and 7 inch bore, 4*d*. each; 9 inches long and 2½ bore, 35*s*. per 1000. At Stapleford, Notts, an improved kind of Tiles are made, which have a return at their edges, making a flat or step of 1½ or 2 inches wide, on which the Tile stands, and which prevents its pressing into the soft bottom of a Drain, by the weight of earth above; which, unless that flat stones or tile-sheads are laid under the edges of the common Drain-Tiles, in such situations, they are apt to do, and lessen or even choke up the passage for the water; these, 12 inches long, are sold at 50*s*. per 1000: such improved Tiles are also made at Snareston, Leicestershire.

At Uttoxeter, Drain-Tiles 12 inches long, are sold at 2*d*. each; Pipe-Bricks 9 inches long, at 8*d*.; and others of larger bore, 10½ inches long, at 14*d*. each.

By placing a row of common Building Bricks flat across the bottom of a Drain, and setting on edge upon these a row of large Pipe-Bricks, separated as far as the floor will admit, and covering these with another similar row of Building Bricks across, a strong and capacious Drain is formed, for those places where much water is to be conveyed.

At Blackwall, and other situations on Shale, where the Springs deposit Ochre, an inconvenience was experienced in the use of the Pipe-Bricks, laid one on the other, owing to their straight edges fitting so close, and soon choaking with the Ochre; which Mr. Blackwall remedied, by having his Pipe-Bricks (made at Wirksworth Moor) scolloped or waved along the edges, to prevent this close fitting on each other: for two years these were allowed to be made Duty-free, but they have since been charged with a Tax of 12*s*. per 1000, as Mr. Blackwall informed me, which has raised the price to 52*s*. and almost prohibited their use. How injudicious are such modes of raising Revenue! delaying and preventing the first and most important of all Improvements, on a large portion of the surface of England, which abounds with wet and cold soils, in a proportion very greatly exceeding those of an opposite or any other description.

In the Rocky Limestone Districts, Clay is of important use, for lining the bottoms of their Artificial Ponds or Meers: tenacious or plastic *Clay* fit for this purpose, they call Water-Clay, and in several places procure such from the decomposed bassets of the Toadstone Strata, as in Brassington, ¼ *m*. E N E, from the 3rd Toadstone; at Copt Houses N, in Peak Forest, from the 3rd Toadstone; Hurdlow, ¼ *m*. N, in Hartington, from ditto; Monyash Church, from 1st Toadstone; Taddington, ¼ *m*. SW, from the 2nd Toadstone; Tideswell, 1 *m*. N, from ditto; &c.

It remains to mention but one other use to which

Clay is applied in these Districts, viz. burning it for repairing Roads. At Shipley, Edw. M. Mundy, Esq. formed his private Roads of a sort of Bricks, made without the corners, to avoid the Duty, and burnt on purpose; I also saw Clay burning, in large spits or spadefuls, dried and mixed with small Coals in Heaps, by the Surveyors of the Roads, at Over-Moor in Tibshelf, adjoining Notts: and also at the Collieries on the S of that Town; at Brecks in Wickersley, in Yorkshire; &c.

Marl.—The important strata of Red Marl which occupy most of the southern parts of Derbyshire, have been so fully described in the 4th Section, page 146, as to require little to be said here, except giving a List of a few places where I happened to observe large *Marl-Pits*, used by the Farmers of the present or former generations, viz.

Allestry S.
Donkil-Pits in Catton.
Doveridge N.
Ingleby.
Persal-Pits in Croxall.
Radurne.
Rodsley.
Waldley, near Marston-Montgomery.
Wild-park, near Muggington.
Wooton NW, near Weaver Hills, Staffordshire.
&c. &c.

The Alluvial, red and brown Marls which prevail in Cheshire, as described by Sir John T. Stanley, in Mr. Holland's Cheshire Report, p. 351, extend into the north-west extremity of Derbyshire, and have been extensively used along the western skirt of the parish of Glossop, as the large and ancient Marl-Pits testify, in Charlesworth, Ludworth, Marple-bridge, Woodseats, &c.; and where, as well as in the adjacent

Brooks, the same large Bolders of Granite and other foreign stones are found, as in Cheshire, where I observed them, in the Marl-Pits on Werneth Low Hill, Philosophical Mag. vol. 34, p. 50. On the south-east of Tibshelf there are large ancient Pits, which seem to have been Marl-Pits of this description, and so perhaps was the large Pit on the south of Morley Church, and others.

When about to terminate my Survey towards the westward, in the neighbourhood of Dilhorn, in Cheshire, I observed at Bank Top, N of Dilhorn, and on the S E of Cellar Head Inn, and other places near, a red lamellar Marl, approaching to purple in some places, which had thin beds of dark compact Limestone in it: from the importance of these, I lament, that the general distribution of sandy Quartz Gravel on the surface, and the ruptured and dislocated state of the Strata under it, prevented my being able, satisfactorily, to refer this Marl and Limestone to their place in the Series of Strata; probably they may belong to the 1st Coal-shale: of which some instances, but without any Limestones being noticed, have been given at p. 446.

The softer parts of the Tufa or deposits made by Springs from the Limestone Rocks, mentioned below, at Matlock-Bath and some other places, are called Marl, and according to tradition, were formerly used as such, but the practice is quite laid aside I believe.

Tufa, Tophus, Puff-stone or Marl-stone, is a porous soft stone of modern formation, which the Springs of Water issuing from the calcareous Rocks have deposited, in some of the Valleys, enveloping the Horns, Bones, Teeth, and other parts of Animals, and Leaves and Stems of Plants, &c. The largest accumulation of this kind is at Alport, near Yolgrave, occasioned as I think, I think, by a Spring which issued from the Rock, extending towards Haddon Field, but which, probably owing to the works of the earlier Miners, is now diverted into other channels: this Spring seems to have deposited a large Hill of Tufa, and to have spread the same quite across the channel of the Lathkil River, just at the junction of the Bradford River with it, and has dammed up the Lathkil, so that it falls suddenly 15 or 20 feet into the Bradford, though a much smaller River: at Matlock-Bath the mass of Tufa is very considerable, and is yet accumulating, by the Derwent side. The following are the places where I observed large masses of *Tufa*, viz.

Alport, near Yolgrave.
Bolsover, NW.
Brassington.
Cressbrook Dale, near Litton.
Griffe, near Ible.
Matlock Bath.
Millers Dale, near Wormhill.
Monks Dale, W of Tideswell.
Monsal Dale, near Little Longsdon.
Slaley (Mary-grot Spring) in Bonsal Dale.
Tideswell, 1½ m. S.
Wormhill, S.

Besides being used as a Freestone in some cases (page 416), and as Marl for the Lands in others (page 457, a kind which is found in the bottom of Tideswell Dale, is applied to the making of Chimney-tops; a hole being drilled through a block, and a narrow turning saw used, to saw out the inside in a cylindrical form: the outside is then sawn to shape, either round, square or octagonal, and these make very durable and handsome substitutes for Chimney-Pots.

STALACTITES and *Stalagmites* of Carbonate of Lime, of various sizes, hues and structures are found, pendant from the Roofs and accumulated on the floors of several of the Caverns in the List, page 292, and also in the smaller openings and cavities in the Mines (page 252), and Limestone Quarries (page 408), see Mawe's "Mineralogy of Derbyshire," page 90: of these, different Articles are manufactured, by the Petrifaction-Workers of Derby, Bakewell, Buxton, Castleton and Matlock-Bath. Philip Gell, Esq. of Hopton, has an elegant massive Vase, 38 inches across and 14 inches high, carved from a Stalagmite, found in a Shake-hole on Hopton Moor some years ago.

CALCAREOUS SPARS*.—The Crystals of Carbonate of Lime which occur in Derbyshire, are very various and very beautiful, see Mawe's "Mineralogy of Derbyshire," p. 88: the most common, is the hexagonal pyramid or Dogstooth Spar: in enumerating the produce of the principal Mines, page 252, these Spars produced in the following places, have been noticed, some of them very large, viz.

Ashover, Westedge Mine.
Cromford, Ash-cross, and Gang.

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* In four places in M. Werner's New Theory of Veins, viz. pages 147, 173, 175 and 219 of the English Translation, the Vein-stuff of the Derbyshire Lead Mines are mentioned, in all of which *Calc Spar* is either omitted or said to occur, only sometimes *in small quantities*, whereas I believe this to be the most prevailing and abundant of the Spars in the Derbyshire Veins, while *Quartz*, which he mentions twice, is not found in these Veins, in any instance I believe; and *Fluor* abounds more than heavy Spar or *Cawk*, contrary to the order in which they are placed in the "New Theory;" the Translator's *Notes*, might, from Mr. Mawe's "Mineralogy of Derbyshire," p. 72, 88, &c. have corrected the most material of these, at least. The Toadstones of this District, will not perhaps, when the Wernerians shall have seriously undertaken the examining of the several Veins in it, prove the only knotty point, in the application of their "New Theory."

Great Longsdon, Longstone-edge-venture.
Hopton, Yoke-cliff.
Matlock, Dimple.
Middleton by Wirksworth, Bondog-hole.
Overton in Ashover, Overton, Gregory.
Peak Forest, Oxlow.
Roston, Birchwood-park.
Sheldon, Field-Rake.
Stanton in the Peak, Stoney-Lee.
Wirksworth, Ranter (Taylor's Venture), Yoke-cliff, &c.

Beautiful Spars are also occasionally found at many others of the Mines, and in the cavities in the Lime-Quarries sometimes.

GYPSUM or crystallised Sulphate of Lime, has been treated of in Sect. 4, page 149, when it occurs in the large way, in the Red Marl Strata: it remains here to mention, that various small and beautiful specimens of this substance, occur also in the Mineral Limestone District. See Mawe's "Mineralogy of Derbyshire," p. 83.

FLUOR SPARS, or Crystalized Fluates of Lime, are found in great beauty and vast variety, in the Mines in Derbyshire, see Mawe's "Mineralogy of Derbyshire," p. 75; the coloured varieties are often called *Blue-John* by the Miners. The Mines in which *Fluor* has been noted, in the List page 252, are as follows, viz.

Ashover, Fall-hill and Westedge Mines.
Bonsal, Ball-eye.
Bradwell, Picture-end, Small-dale-head, and Tanner's-venture.

Castleton, Cliff-side, Millers Pipe, Odin, Old-Tor, and Water-hull.
Crich, Crich-Cliff.
Cromford, Ash-cross, and Gang.
Matlock, Dimple, Knowle's, and Seven-Rakes.
Overton, Gregory.
Roston, Birchwood-park.
Wirksworth, North-Cliff, Orchard, and Ratchwood, &c.

The quantity of Fluor Ornaments which are manufactured at Derby, Bakewell, Buxton, Castleton and Matlock-Bath, is very considerable; besides which, there is a consumption of the yellow and inferior kinds of this Spar, at Ecton Copper Works, from Knowle's Mine, and at Butterley and Somercotes Iron Furnaces, from the Mines at Crich Cliff, as fluxes for their Ores.

Barytes, Crystallised Sulphate of Barytes, Terra-Ponderosa, Cawk*, or Tush, is found in great quantity and variety, in some of the Mines of Derbyshire, see Mawe's Mineralogy, page 86. It is found in the Mines of the following places, viz.

Ashford.
Bonsal, Bonsal-Leys Mines.
Bradwell, Moss-Rake.
Brassington.
Calke, Dimsdale.
Carsington.
Castleton, Odin.
Crich.

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[*] The *Croyl* Stone of Dr. Woodward? "Method of Fossils," p. 18, and "Catalogue of Fossils," I. p. 157.

Cromford, Cawk-Vein, and Meers.
Eyam.
Middleton by Wirksworth, Bondog-hole, and Gang (Great-Pits).
Monyash, Hubberdale.
Overton in Ashover, Overton.
Sheldon, Hubberdale.
Stoney-Middleton.
Wirksworth, Bage, Boggard, Orchard, Ranter, and Ratchwood,
&c.

In a Stone-Pit on the south side of Birchwood-moor Houses, in Roston, I saw several strong Veins of rose-coloured Barytes, with thin strings of Lead Ore in them, in what appeared to me to be a Gravel Rock? foreign to the Derbyshire Strata, as Alderley-edge is, p. 252. Formerly, I have heard, that some Barytes was sent from the Derbyshire Mines into the Pottery District in Staffordshire, but I could not learn any use to which it is at present applied.

Sand.—There is not, I believe, in the whole Series of Strata within the limits of my Survey, any regular stratum of Sand, except that below the Lias Clay, mentioned page 115, notwithstanding the numerous Sand or Grit Stone Strata, which consist of grains of Quartz, slightly cemented together: and the only stratum which I found occasionally loose, or in the state of Sand when not exposed, is that which immediately underlays the yellow Limestone: this is however most commonly found concreted as a Grit-stone, as on the SW side of Hardwick-hall, and other places. The white Sand in the Red Marl at Normanton (p. 148), seems to me to be an accidental bed, among the numerous anomalies of these Strata, and not a continued stratum underlaying Derby, as the late Dr. Darwin supposed in his Phytologia. In some situations, the Grit-stones are found decomposed, and the particles of Sand loosened, on the surface, as on the 2nd Grit Rock in Dethick, near Matlock, on the Shale Freestone N of Whiteknowl in Chapel-en-le-Frith, and other places. In several places on the eastern side of Derbyshire, there are found patches of red loamy or marly Alluvial Sand, in very regular layers, which are excellent as *Founders' Sand*, or *casting* Sand; in others, a sharp Sand, fit for the cleaning of utensils, called *Scowering Sand*, is dug, and in many situations the Sandy Gravel (see List page 134) is used, after separating the stones by a sieve, for making Mortar, sanding Floors, &c.; but in many places their Sand is procured, by the pounding of the loose or surface Grit-stones: beds in some particular Quarries are also found adapted to making Sand by crushing, as at Alton Quarry, N E of Ashover. At Buxton, large edge or rolling Stones are used for crushing Grit-stone, to make Sand for Mortar, and other purposes.

The following is a List of the *Sand-Pits* which I noticed, distinguishing their kinds and uses, viz.

Bagthorpe S E (Sheepston Hill), Notts, yellow, alluvial.
Barlborough Town W, yellow, under yellow Lime.
Black-Brook, on Charnwood Forest, Leicestershire, red and yellow, in Red Marl (see p. 306).
Bolsover, 1½ *m.* E, red casting, alluvial.
Brassington N E (Bald-Mare), scowering, alluvial? and near Harboro Rocks, 3rd Toadstone?

Bullhurst E, in Muggington, yellow, alluvial.
Clown Town W, yellow, under yellow Lime.
Dale-Abbey N W (Pindale), red casting, alluvial.
Derby W (Steeping Lane), yellow, in Red Marl.
Dethick, near Matlock, yellow, from 2nd Grit.
Ecclesfield NW (Grena-wood), Yorkshire, yellow casting.
Elmton E (Frith-wood, and Common), red, casting, alluvial.
Etwall S E, yellow, alluvial.
Hopton N (Via-Gellia), scowering, alluvial?
Kirkby, SW of the Town, Notts, yellow, under yellow Lime.
Knitaker, N E of Barlborough, yellow, under yellow Lime.
Kniveton Town, yellow casting, alluvial.
Mansfield, Notts, red casting, alluvial.
Measham S, yellow, alluvial.
Milkhill Gate, 1¼ *m.* E of Caldon, Staff. alluvial in a 4th Lime fissure.
Newhaven, ¼ *m.* N E, in Hartington, alluvial in 4th Lime fissure.
Normanton S, near Derby, very white, in Red Marl.
Ockbrook N (Dumshill), red casting, alluvial.
Pecks Mill, near South Anston, Yorkshire (Street Lane), yellow, under yellow Lime.
Radburne Common, near Mackworth, yellow, in Red Marl.
Ripley S E, yellow, alluvial.
Roston E S E (Common), alluvial.
Rotherham S (Boston Castle), Yorkshire, casting, from Grit.
Rothley W (R. Plain), Leicestershire, yellow, alluvial.

Stanton by Dale W, yellow casting, from Grit.
Strelley SW, Nottinghamshire, yellow, under yellow Lime?
Swarkestone W, yellow, scowering, alluvial.
Trowel Heath, S E of the Town, Notts. red casting, alluvial.
Turnditch W (Cross o' the Hands), yellow, alluvial.
Whaley-bridge N, in Cheshire, yellow, alluvial.

All the Sands in the above List, and most others in these Districts, are silicious. About 1¼ *m.* E S E of Buxton, in Cummins Dale, I noticed a quantity of Calcareous Sand, composed of small rhombic crystals, the debris of one of the Rocks in the adjacent Cliff, see page 298.

Fullers' Earth.—No Stratum of this Mineral occurs in Derbyshire, but lumps of it, of considerable size, very pure, and much like that of Bedfordshire, are frequently found in the Quartz Gravel Pit, ¾ *m.* E of Bretby Church: similar lumps occur in the hard Gravel Rock under Measham Town, and smaller ones in the alluvial covering of the Gypsum Quarries, S E of Chellaston. In Brassington a Clay is dug, with which they scower Cloths: and at Brathwell, NW of Tickhill, in Yorkshire, considerable quantities of Fullers' Earth are got, as I have been informed, probably alluvia on the yellow Lime.

Steatite.—This substance is found in Stubben Mine, E of Bonsal Church, in the 2nd Lime, in Suckstone Mine in Brassington, in the 4th Lime, and in others, I believe.

Mica.—This substance, in very small thin shining plates, called Silver, Spangles, Glist, Daze, &c. prevails through nearly all the numerous Grit-stones of the Coal-measures, and in many of the Shales and Binds of those Strata, as also in the great Limestone Shale, and particularly in the accidental beds of Silicious Grit-stone which occur in it: also in the accidental beds of Grit-stone in the Red Marl, and in the Grit-stone of the Coal Series near Hartshorn, N E and S. In the Gravel Rock? at Birchwood-moor, in Roston, and in Crow-stone in Broadhurst-edge Coal-Pit, S E of Mellor, I noticed small plates of Mica, so universally are these minute plates distributed, in the Silicious Stones of these Districts.

The shistous fracture of most of the Silicious Paviers and Slates, in the Lists pages 424 and 429, is occasioned by layers of these minute plates of Mica in the stone. In some places, the 1st or Millstone Grit, contains globular lums, from ½ a foot to 2 or 3 feet in diameter, each filled with a mass, nearly composed of these minute plates of Mica: at first these cores are moderately hard, in Gregory Quarry at Overton in Ashover, where I have observed the greatest number of them, but they soon fall into micaceous, dark, shining Sand, on exposure to the weather. On Bladon Hill in Newton Solney, I found, in the singular Gravel-Pit there, Bolders of similarly concreted Mica, just like what the Alluvial Clays and Gravels of Bedfordshire often contain. The Talk mentioned by Dr. Woodward in his Catalogue of Fossils, vol. I. p. 61, as found at Blackwall, was probably an Alluvial Bolder.

MINERAL TALLOW—is said to be found at Brown Hill in Warslow, Staffordshire, in the Limestone Shale, of a brown colour. In a fissure or sort of small Rake Vein in the 3rd Toadstone, N E of Hopton Hall, a light yellow flexible substance is found, almost like white Leather, in appearance.

BITUMEN.—This singular inflammable substance is found in various degrees of induration, sometimes elastic, and in others resembling Jet almost: see Mawe's "Mineralogy of Derbyshire," p. 91. It frequently occupies the centre of hollow nodules of Limestone, in the lower part of the great or Limestone Shale (see p. 235), and sometimes druses or cavities in the 1st Limestone Rock, as in the Limestone Quarry, ¼ *m.* S of Ashover Town, and in Gregory Mine at Overton, and Odin at Castleton: it is frequently as liquid as Tar, or more so, and is called Rock-Oil in such cases: the quantity of this inflammable liquid was so great, in the driving of Stoke Sough, near Stoney Middleton (page 330), that it swam on the surface of the water, and would take fire from a Candle, and burn for a time, hence called a Burning Spring by Mr. Bray, in his Tour, p. 176. The following are the places where *Bitumen*, Rock-Oil, &c. has been observed, viz.

Ashford.
Ashover, Westedge Mine.
Castleton, Odin.
Cromford, Gang.
Eyam, Brook-head, and Little-Pasture.
Matlock.
Overton, Gregory.
Stoney Middleton, Stoke Sough, above.
Wensley, Duns Lime-kiln Quarry.
Winster, Lime-kilns and Drake Mine.

In the 3rd Toadstone on the N E of Hopton Hall, are small Veins filled in part with indurated Bitumen: a larger a larger one of this sort was some years ago mistaken for a Vein of Coal, as I suspect, see page 175. The Miners of Derbyshire apply liquid Bitumen or Rock-Oil to fresh wounds, with great success, towards their cure, as is said.

SULPHUR.—Considerable quantities of this Mineral are combined with the Lead and other Metals, and the Shales, of this District, and some specimens of native Sulphur have also been found in Virgin Mine in Bradwell, and in Odin Mine in Castleton. At the Lead Cupolas or Furnaces in Bonsal Dale, in Barbrook Dale in Baslow, and in Middleton Dale near Eyam, tall Chimnies or long close Galleries along the sides of the Hills, are constructed, for condensing the Sulphur sublimed from the Galena: small quantities of Arsenic, and other matters capable of being volatilized, are found mixed with the Sulphur thus obtained.

SECT. VI.—WATER.

THE situation of Derbyshire is too far inland, to admit of its benefiting in an Agricultural point of view, from the Sea Fish, Shells, Weeds, or the Mud of the Ocean, nor has it any where the necessity of Embankments against its Tides.

1. *Streams and Rivers.*

In speaking of the Surface of Derbyshire, in the 1st Section of this Chapter, and describing the 41 Ridges of high Land, page 4, which are shewn in the Map facing page 1, the names and situations of most of the Rivers in the District are pointed out, they have also been separately shewn in the Map annexed to the original 4to. Report, and can readily be traced on any Map. I shall therefore proceed to point out some particulars of the course, and the nature of the bed, of each River; and give the space, or number of Acres nearly, on which each collects its water.

The *Trent* claims our first notice, as being the largest River in or near to Derbyshire, and as effecting the drainage of nearly ten thirteenths of the surface of the County, viz. 477,500 Acres of it, out of 622,080 Acres, exclusive of the Idle, which also falls into the lower part of this River. The course of the Trent, from where it first touches the border of this County, ¼ *m.* N of Croxall, at the mouth of the Mease, until it leaves its border again, 1½ *m.* E of Long-Eaton, at the mouth of the Erewash, is through a very wide excavated Vale in the Red Marl Strata, having a steep bank of these Strata close to the River, at Burrow-Hill SSW of Walton, on the south of the River, at Scropley Hill E of Burton Church, at Bladon-Hill SW of Newton Solney, and at Holywell-Hill W of Repton: of Gravel Rock NW of Ingleby: of Red Marl and Freestone at Weston Cliff and Church, N of the River, which is the only place that the high ground approaches its stream on this side. In Donnington-park, and W and N E of it, the Cliffs of Red Marl and its Freestone, form the southern bank of the River: and at Red-Hill, and thence to Trumpton in Nottinghamshire, those of Red Marl and Gypsum do the same. The bottom of this noble Valley is less deep than the original Excavation in the Red Marl, being filled to a certain height, and levelled, with sandy small Quartz Gravel, mixed with a few Flints, and other distant Alluvia of this

Island,

Island, and some few small thin Stones of the adjacent districts: the Map of Strata and Soils facing page 97, by the Brown colour thereon, will shew how this Gravel is distributed.

The Vale of the Trent in Derbyshire, with the short Vales which drain by their Brooks into it, and by Rivulets without Names, occupy together about 70,000 Acres of the surface of Derbyshire; this being exclusive of the Vales or Drainages of the Erewash, Derwent, and Dove on the north, and the Mease on the south of Trent, and of their Collateral Streams.

The lowest five miles of the Trent, where it bounds upon Derbyshire, from the mouth of the Erewash River to the entrance of the Trent and Mersey Canal, at Wilden-Ferry in Shardlow, is now the only *Navigable River* remaining in or near to Derbyshire, the Navigation from Wilden-Ferry up to Burton Bridge, which was made by the Earl of Uxbridge, in pursuance of the Acts of the 10th and 11th of William III., having been discontinued in the year 1805, in consequence of an agreement with Hugh Henshall and Co. the Proprietors of the Trent and Mersey Canal, which runs by its side (see Sect. 3, of Chap. XVI.); and the Navigation on the Derwent River, from Wilden-Ferry up to Derby, having been discontinued since 1794, when the Derby Canals were finished. From this five miles of Navigation on the Trent River, the Loughborough Navigation, by the side of the Soar, branches to the south, and the Erewash Canal on the north, nearly opposite to each other.

The *Derwent* is the principal River of Derbyshire, collecting the whole of its waters from the surface of this County, except from about 5000 Acres in Yorkshire, near its source on the east side, and from 12,000 Acres in Nottinghamshire, at one of the heads of the Amber branch to this River.

The smaller Rivers or branches to the Derwent on its east side, are the *Bootle* and the *Amber*, and on its west side the *Morledge*, *Ecclesburn*, *Bradford* and *Lathkil*, *Wye*, *Noe*, and *Ashop*, besides smaller Brooks and Rivulets, which are reckoned with the Derwent itself, and the whole space which these occupy, including the 17,000 Acres above mentioned, is 288,500 Acres of surface, draining to and venting its waters into the Trent at Wilden-Ferry, above mentioned.

The course of the *Derwent* from Wilden-Ferry up to the great Derbyshire Fault E of Allestry (see p. 146), is very widely excavated in the Red Marl Strata, and partially filled again with sandy Quartz Gravel, mixed with thin and light Bolders of Limestone, particularly in the upper part of this distance: the present channel of the River closely approaches the steep bank of Red Marl at Burrowash Mills, and again for some distance, from the north end of Derby Town to Darley-Abbey. For about a mile between the Fault above mentioned, and the great zig-zag Fault S E of Bur-Hill (see page 162), the Excavation is immensely deep and wide into the upper part of the Coal Series, as I judge; from thence for about 2¼ *m.* the Excavation is in the Limestone Shale, the River approaching a Hill of Limestone Shale at Bur-Hill, W of Little Eaton, and others, in a range called Duffield Bank, having the 1st Grit Rock upon them; the Quartz Gravel floor to the Valley, extends up as far as this Excavation in Shale near Makeney, but no further. Between Milford and Makeney, the River is deeply and suddenly excavated in the 1st Grit Rock, which is there crossing to

the

the west side of it, and the River then for about 2 *m.* has its course in the 1st Coal-shale, and the Argillaceous Grit beds in it, crossing the line of Section in Mr. Whitehurst's Plate II., 2nd Edit. of his "Inquiry," near the SW corner of Belper Town; the 2nd Grit Rock upon it, being cut entirely through at the N end of the Town, and a large Hummock of it left to the W, which the Wirksworth Road crosses. For about the next mile and quarter, the Excavation is again made very deep in the 1st Grit Rock, up to Toad-moor Bridge at Blundon-Ford, near the mouth of the Amber, and thence the same is cut in the Limestone Shale, to Cromford Bridge, having entered the western edge of the great Denudation around Crich (see page 171), the 1st Grit forms prodigious Cliffs in the Heights on each side the River, up to Coddington, near the mouth of Wakebridge Sough (now driving to the Crich Cliff Mines), on the west side, these Cliffs of 1st Grit turn off, on the north side of Cromford Moor, to Barehill Edge Hill, and on the east side they terminate abruptly at a Fault.

At Cromford Bridge the Excavation enters on the 1st Lime Rock, and having cut through this, at the Paper Mill in Matlock-Bath Dale (see page 68), it crosses the 1st Toadstone (which is here crossing the River to the east bank, see page 281); from hence for about $\frac{2}{3}$ of a mile, the bed of the River is on the 2nd Lime Rock: the 1st Toadstone then again crosses to the west side, and immediately the 1st Lime Rock does the same; and then the River runs for a short distance upon an Excavation in a sunk piece or Trough of Shale, and quickly after, by a rapid rise of the measures towards the north, the 1st Lime, and then the 1st Toadstone, again cross the River, and immediately the 2nd Lime

Rock does the same; and the River then for about the $\frac{1}{6}$ part of a mile, at the foot of the High Tor, runs upon the 2nd Toadstone*, as shewn in the Section in *Plate* V. facing page 129, see also page 243; the main trunk of the Derwent being here deeper excavated in the series of Strata, than in any other part of its course. Near the north end of the High Tor, the 2nd Lime Rock again crosses the River to the west, and the 1st Toadstone also, and the River runs in or upon the 1st Lime Rock, until about half a mile above Matlock Bridge, when the same gets again upon the great Limestone Shale (as below Cromford Bridge and below Milford Bridge), and continues for many miles to run in deep excavations in this Shale, and the Shale Grit-stone which it sometimes contains (except touching a denudated patch of 1st Lime in Wensley, opposite Darley Church, see p. 243), and having massive Cliffs often of the 1st Grit in the heights above the River, until near its source upon this 1st Grit Rock, at the place called the Trough on the Grand Ridge, at the Bounds of Yorkshire, as mentioned page 4.

I shall now proceed to mention briefly, the principal Strata traversed by each of the smaller Rivers branching from the main trunk of the Derwent above described, in order as above, viz.

The *Bootle* Rivulet or Brook, joins the Derwent S of Little-Eaton, its course thence up to Coxbench being

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[*] The late ingenious Mr. John Whitehurst, erred in asserting, in both editions of his "Inquiry concerning the Earth," that the Derwent here runs on loose and broken stuff, between the 2nd and the 1st Toadstone (see also, the Translation of Werner's new Theory of Veins, Supplement, p. 234); since the publication of Mr. Whitehurst's Work, the Miners having driven a Gate across *under the River*, in solid and unbroken Measures. See the Philosophical Magazine, vol. 31, p. 36.

near to the great zig-zag Fault, upon the upper part of the Coal Series; at Coxbench it crosses the 3rd Grit Rock, then the 3rd Coal-shale, the 4th Grit, and so on ascending the Series, to its source, near Ripley Town; and its branch from Smalley also, ascends the Series towards its course.

The *Amber* River empties itself into the Derwent at Toad-moor Bridge, upon the Limestone Shale, and continues therein and in Shale Grit-stone, until E of Bullbridge Aqueduct; it then crosses the 1st Grit (with a rapid E dip), and then the 1st Coal-shale, 2nd Grit, 2nd Coal-shale, &c. to Pentrich-lane, where it has got upon the 5th Grit or higher, when turning northward, its course follows nearly the edges of the same Strata to Ford, NW of Higham, where it turns NW and crosses the 4th Grit, the 3rd Coal-shale, 3rd Grit, &c. until near Mill-town its Excavation crosses the 1st Grit, and enters the highly curious denudated Dale of Ashover, descending the Series on to the Limestone Shale, 1st Lime, and 1st Toadstone, which is excavated for near a mile (see p. 171 and 242), and then its course ascends to the 1st Lime, the Limestone Shale, the 1st Grit, near Bowers Mill, and takes its rise on the 1st Coal-shale, near to Moor-Hall in Ashover. The other main branch of this River, from Toad-hole Furnace eastward, continues to ascend the series of Coal-measures, till crossing the zig-zag Fault W of Sutton in Ashfield in Nottinghamshire, it has its source from the edge of the yellow Lime.

The *Morledge* Rivulet or Brook, falls into the Derwent in Derby Town, on Red Marl and Gravel, its various ramifications being excavated in Red Marl, except its several extreme northern branches, which cross the great Derbyshire Fault, between Allestry Town and Mansel-park, and are excavated in the great Limestone Shale, or in the Quartz Gravel with which it is there locally covered.

The *Ecclesburn* River falls into the Derwent at Duffield on the great Limestone Shale, and in which it is excavated, through all its ramifications, except that, at its sources near Wirksworth, these Excavations extend into the 1st, and the 3rd, and 4th Limestones; and that on the south of Turnditch, a local patch of the Shale Limestone is cut and laid bare by a branch of these Excavations, see p. 230.

The *Bradford* and *Lathkil* pour their united streams into the Wye, west of Great Rowsley, near its junction with the Derwent, on Limestone Shale: through which they are soon excavated, so as to lay bare the 1st Lime Rock below Alport (see page 68), where the Lathkil and the Bradford meet, on a bed of Tufa, as observed page 458; from hence the course of the *Bradford* proceeds westward in the 1st Lime Rock, which it cuts through on the SW of Yolgrave, and lays bare the 1st Toadstone for a short space (see page 243), when it crosses the great Bakewell Fault (see p. 291, Note), and again ascends the Lime and skirts the Shale, which it ascends near Gratton, taking its rise upon this stratum near Elton. The *Lathkil* Excavation pursues the 1st Lime to the south side of Over-Haddon, where it descends the Series on to the 1st Toadstone, cuts through it, and lays bare a patch of the 2nd Lime, as mentioned, page 243; but which not being excavated so deep as the Toadstone below, occasions a sudden fall in the River, whose course, after crossing the great Bakewell Fault (see p. 291, Note), again ascends on to the 1st Lime, in which it is deeply cut (page 68) up to Monyash, where it approaches the basset of the 1st Toadstone;

stone; but turning to the N W, it keeps in the 1st Lime till near the branching of the Taddington and Flagg Roads, where it crosses the 1st Toadstone basset, and proceeds in the 2nd Lime, till opposite the Wells in Flagg Village, where it crosses the basset of the 2nd Toadstone, and then branches in different excavations in the 3rd Lime Rock, wherein the Vales terminate, but the water seldom runs on the surface above Monyash.

The *Wye*. This most interesting River empties itself into the Derwent at Great Rowsley, upon the Limestone Shale, as mentioned above, and on the south side of Haddon-Hall crosses the great Bakewell Fault (see p. 290, Note), which brings up the 1st Lime, in which the Vale is excavated for a short distance, and then again in the Shale up to Bakewell Town, where the Lime, rising rapidly N W, is cut again, and at the Cotton-Mill the excavation enters the 1st Toadstone (page 242), and continues in it, until crossing again the great Bakewell Fault, the Shale and Shale Limestone are then excavated, up to Ashford and beyond, when the 1st Lime is again cut through, the 1st Toadstone, 2nd Lime, and an Excavation made in the 2nd Toadstone, at the west front of Fin Copt Hill (see page 33), which in this respect, and its number of Strata, resembles Matlock High-Tor, represented in *Plate* V. facing page 129. From hence through Monsal Dale (page 69), the 2nd Toadstone is in the bottom and west side of the Dale, and below the mouth of Cressbrook Dale the Excavation enters on the 3rd Limestone, and continues the same through Miller's Dale (pages 69 and 243), where the 3rd Lime is cut through for a ½ of a mile, and shews the 3rd Toadstone in the bottom of the Dale. In Wye Wood in Wormhill, near Chee Tor, the River crosses the basset of the 3rd Toadstone, and from thence all the way to Mill Dale, near Buxton (page 69), the Excavation is in the 4th Lime Rock: in Mill Dale the 3rd Toadstone is again crossed with a N dip, and the Excavation for about ½ of a mile is again in the 3rd Lime, to the great Limestone Fault, near Mill-Dale Bridge at Buxton Town's end (page 287); from whence turning W, the Excavation proceeds in Shale on the north side of the Baths, and so continues to its sources near the Grand Ridge by the Manchester, Macclesfield, and Leek Roads.

The *Noe* River falls into the Derwent at Malhambridge in Hathersage, on the Limestone Shale, and is excavated therein through its whole length to Edale-Head, and to Castleton.

The *Ashop* River falls into the Derwent at Cock-Bridge, south of Darwent-Chapel, on the Limestone Shale, and all its different branches are excavated therein, except some of their extreme ends, which penetrate the 1st Grit, on the heights.

Thus it appears, that the Derwent River, which collects its water from very deep Excavations in the *lowest* known Stratum in all this District, the 4th Lime Rock, both by its Wye branch and its Noe branch from Castleton Peaks Hole (see page 289), conveys the same on to the *highest* known Stratum of the County, the Red Marl; and a similar remark will apply to the Dove River, of which I shall next treat.

The *Dove* River empties itself into the Trent at Newton-Solney Ford, on Red Marl covered by sandy Quartz Gravel, about a mile above which it passes under the Trent and Mersey Canal, through twelve low Aqueduct Arches, from whence for many miles its course is very widely excavated in the Red Marl Strata, and sandy Quartz Gravel, mixed with thin rounded Limestones, is lodged as a floor in the bottom of this Valley, in so regular a manner, as to form flat Meadows (occasionally flooded) from ½ to 2 miles wide, the adjacent heights being composed of Red Marl in horizontal strata; which at Row-Bank contain layers of Gypsum, near Coton in Hanbury, Staffordshire, and in other places near, see p. 151. Above Hanging-Bridge, on the Road from Ashburne to Leek, the great Derbyshire Fault (see p. 146) crosses this River, and suddenly terminates the Red Marl, bringing the Limestone Shale opposite to it on the north side, and in which, and the Shale Limestone belonging to it, the Dove Valley is excavated, to the crossing of the great Limestone Fault (see page 283) at the entrance of Dove Dale, near Thorpe. For a considerable distance above and below Hanging-Bridge, a vast mass of sandy Quartz Gravel Rock? is lodged, and in which the Valley of Dove seems excavated; about ¼ *m.* above Mappleton, the Quartz Gravel in the Vale ends, and above this, the small quantity of Alluvia which is lodged in the bottoms of the Vales, consist of thin Limestones, and other native alluvial matters. From the great Fault last mentioned, the highly curious Dove Dale commences (see page 66), having the two surprising Hills of 4th Limestone, Bunster on the W and Thorpe-Cloud on the E, at the entrance of the Dale, and between which the Excavation is very narrow, and the Rocks precipitous; and so it continues, with a few local exceptions, for near 5 *m.*, the Dove running, in great part of this distance, upon lower Strata in this immense 4th Lime Rock, and in the general Series, than are perhaps any where else visible in the British Islands. For about ¼ *m.*, after crossing the great Limestone Fault again, near Wolfscote Hall (see p. 286), the Excavation is partly in Shale on the W, and partly in 4th Lime on the E, when again crossing the Fault, the Excavation passes again through the 4th Limestone for about ⅓ *m.* forming Beresford Dale (see page 64), and finally crossing the Fault at the north end of this Dale, its further course for several miles is in the Limestone Shale, often skirting close to the great Fault and 4th Lime Rock, till crossing the Buxton and Leek Road (about ½ *m.* N of what is usually called Dove-head, at the bounds of Derbyshire), it soon after enters the 1st Grit Rock, which it cuts through between the great and middle Axe-edge Hills (see p. 17); the Dove taking its rise in the Bog upon the 1st Grit and 1st Coal-shale, near Thatch-marsh Colliery.

The *Schoo* River falls into the Dove about ¼ *m.* below Hanging-Bridge in Ashburne Parish, probably on Coal-measures covered by Gravel (see page 159), and is excavated therein till near the Church at Ashburne, when the great Derbyshire Fault above referred to, is crossed, and the Excavation continues in Limestone Shale, and though Shale Limestone therein at Agnes-meadow and thence to Atlow, and proceeds again through Limestone Shale, to its source at Stainborough near Hopton; near to the great Limestone Fault, which a dry branch of this River's Excavations crosses (page 283), and proceeds some distance in the 3rd Toadstone and 4th Lime, NW of Hopton.

The *Dane* is a River in the Western Drainage of the Island, which having its source in the County of Derby, passes Congleton, unites with the Weaver, and falls into the Mersey. At Congleton in Cheshire, the Excavation for this River is in Red Marl, which continues to some distance above Northrode, where the continuation

tinuation of the Great Derbyshire Fault crosses the Dane (see page 146): the Excavation then probably crosses a corner of the upper Coal Series, but soon crosses another great Fault, and enters the Limestone Shale, which and the Shale Grit-stone in it, it pursues till about $\frac{1}{4}$ *m.* above Dane Bridge in Wincle-Chapel; the Excavation then pursues the line of a Fault, in Shale on the N and 1st Grit on the S; it leaves this Fault and cuts through the 1st Grit to Gradbatch, where it enters the 1st Coal-shale, the 2nd Grit and the 2nd Coal-shale; when a Fault near Birchen-Clough, again brings up the Limestone Shale, in which the Excavation proceeds a short distance, and then cuts through the 1st Grit Rock to Paniers-pool Bridge, at the corners of Cheshire, Staffordshire, and Derbyshire; whence it proceeds N a little way in the 1st Grit, and crosses a Fault at Gallywood-House, into the 2nd Coal-shale, which it pursues past Dane-head Colliery, and then for a considerable distance through the 2nd Grit Rock to Thatch-marsh Colliery, and on to the 1st Coal-shale, where the Dane River originates, from the same Bog which gives rise to the Dove, page 479.

The *Goyte* also is a western River, which uniting with the Ethrow at Water-meetings in Ludworth, forms there the celebrated Mersey, which runs to Stockport and Liverpool: the Water-meetings being in an Excavation in the 2nd Coal-shale, which the course of the Goyte pursues up to Marple-bridge, and there enters the 2nd Grit Rock, which it cuts through, and exposes the 1st Coal-shale in the bottom of the Vale, for some distance above and below Mellor-Mills: the Excavation then again enters and pursues the 2nd Grit, to the crossing to the New-Mills and Marple new Road, when the Rock is again quite cut through, and exposes the 1st Coal-shale for a short distance; then the 2nd Grit is again crossed, and the 2nd Coal-shale, and the Goyte Excavation passes through the romantic New-Mills Dale (see page 70) in the 3rd Grit Rock; which Rock it pursues almost to Bottom-Hall, and then is in the 2nd Coal-shale, till above Whaley-bridge: the 2nd Rock is then pursued to near Taxhall, where the Excavation is in or adjoins a Hummock of the 2nd Coal-shale, for about a mile near Shallcross-Colliery: near Ferneylee the River again runs on the 2nd Grit, which continues to Goyte-moss, where the Goyte originates on the 2nd Coal-shale near Goyte-moss E Colliery.

The *Ethrow* River, which discharges into the Mersey at Water-meetings in Ludworth, as before observed, is there excavated in the 2nd Coal-shale, which it pursues to Woodseats in Charlesworth, and then its course is cut through Cliffs of the 3rd Rock for near a mile, yet it enters again on the 2nd Coal-shale, and pursues it to Wolley-Bridge on the Glossop and Mottram Road; then the 2nd Grit Rock is crossed, and the 1st Coal-shale, at Water-side Mills, the Excavation entering the 1st Grit Rock, which is soon cut through, and it pursues a large patch of the Limestone Shale laid bare in the Valley, on which the River runs till within about ¼ of a mile of the bounds of Yorkshire, when the Excavation again encounters the 1st Grit Rock, and cuts through it, soon after passing the corners of Derby, York, and Chester Counties, when it enters the 1st Coal-shale, on which the Ethrow rises SW of Lady-cross Hill in the Penistone Road.

The *Shelf* Rivulet or Brook falls into the Ethrow on the N side of the Roman Station called Melandra Castle, in an Excavation in the 2nd Coal-shale, partly filled with foreign Alluvia. On the S of Dinting, the 2nd Grit Rock is crossed, and the 1st Coal-shale; at Bridge-end the Excavation of the 1st Grit Rock commences, and it is cut through at the E end of Glossop Town and Mills, the remaining deep Excavation being in the Limestone Shale, and the source of the Shelf is in the Bogs on the same, N of Doctor-Gate Bridle Road.

The *Sheaf* River falls into the Don in the Town of Sheffield in Yorkshire, upon the 9th Grit Rock, the Ponds Colliery being excavated underneath it: between this and Heely-mill, where the Sheaf touches upon Derbyshire, the Excavation has passed through the 8th Coal-shale, the 8th Grit Rock, the 7th Coal-shale, &c. and arrived on the 4th Coal-shale; in about ½ *m*. more south, it has cut through the 4th Grit Rock, and from thence having entered Derbyshire near Oak-Mills, to near the north end of Totley Town, it runs upon the 3rd Coal-shale or great Crowstone-shale; at Totley it cuts through the 3rd Grit Rock, crosses the 2nd Coal-shale, and originates in the 2nd Grit Rock, in Strawberry-Leys Farm on the high or East Moors.

The *Rother* River falls into the Don about ½ *m*. above Rotherham-Bridge in Yorkshire, on the salmon-coloured Grit Rock, in which it is excavated, to Catcliff, and then through other parts of the Coal Series, which I have not yet thoroughly determined, to the SW corner of Folken Wood, where it crosses the 13th Grit Rock, and pursues the 12th Coal-shale, having touched the County of Derby above Woodhouse Mill, and entered it at the mouth of the Gannow Rivulet, till within ½ *m*. of Killamarsh Bridge, and there crosses the 12th Grit Rock, then the 11th Coal-shale and 11th Rock, and the 10th Coal-shale and Rock, just above the Bridge abovementioned; the Excavation then continues in the 9th Coal-shale to Renishaw Bridge, where the 10th Rock again crosses the River, and soon after the 10th Coal-shale and 11th Rock do the same; and the Excavation proceeds in the 11th Coal-shale till near Staveley Bridge, when the 12th Rock is crossed, the 12th Coal-shale is then pursued for a short distance and the 12th Rock is again crossed; the Series is then descended, through the 11th Coal-shale and Rock, the 10th and 9th to the 8th Rock on the NW of Brimmington, laid bare by the Calow and Bull-Close Denudation, see page 163; after which the Series is ascended again in like manner by the channel of the River to the 10th Rock, above Wildens-mill, and in this Rock the Excavation proceeds up the Trough between Chesterfield and Hady, to the Bridge on the London Road above Chesterfield, having, opposite the Iron-Furnace, cut through the Rock and exposed the 9th Coal-shale for a short distance: from the Bridge last mentioned as far as Park-House Mill above North Winfield, the 10th Coal-shale is followed, the Rother taking its rise on this same Stratum at Littleworth near Stretton.

The *Hipper* River falls into the Rother at the S E end of Chesterfield, on the 10th Grit Rock, in which it continues to be excavated for ¼ *m.*, then the 9th Coal-shale for about the same space, then the 9th Rock, the 8th Coal-shale, and so on, descending the Series to near Holy-moor-side, where the 4th Grit Rock is crossed, the Excavation then pursues the 3rd Coal-shale for ¼ *m.*, and then cuts through the 3rd Grit, and takes its rise on the 2nd Coal-shale on the W side of Harwood-Grange in Beeley.

The *Dolee* River falls into the Rother near Hague, below Staveley, on the 11th Coal-shale; its Excavation cuts through the 12th Rock below the Aqueduct

Bridge of the Chesterfield Canal over this River, which stands on the 12th Coal-shale; at Netherthorp it cuts through the 13th Rock, and pursues Coal-measures which I am not thoroughly acquainted with, to Bolsover Water-Mill, from whence it follows nearly the course of the great zig-zag Fault for some distance (see page 162), and then leaves it on its E side; on the SW of Heath Church the 13th Rock is again crossed, and the 13th Coal-shale, and the 12th Rock is pursued, until it terminates abruptly at Stainsby Water-Mill, where the great zig-zag Fault is again crossed; and the Measures which basset from under the yellow Lime are pursued by the Excavation, the rise of this River being near Over-Moor on the Tibshelf and Mansfield Road: about 1000 acres in Nottinghamshire to the eastward of this main branch, draining into it, as shewn in the Map of Ridges facing page 1.

The *Idle* is a River of Nottinghamshire and Yorkshire, which falls into the Trent at Stockwith, having several heads or principal branches, four of which rise in Derbyshire upon the yellow Lime, and continue upon the same, until they quit the County, soon after which they each enter the Sherwood Gravel: one of these streams, which rises on the E of Bolsover, passes through a curiously excavated Valley in the Lime, called Markland-Gripes, on the N E of Elmton, see page 68, and through another in a lifted part of the yellow Lime, called Cresswell-Crags, adjoining Nottinghamshire. At Walley old Furnace near Over-Langwith, a branch of the Palter is deeply excavated in the Lime; and so is the Medon, about the Cotton-Mills at Plesley old Forge: the Excavations for this last stream from Plesley up to Hardwick Park and Teversall, and at Stoney-Houghton, lays bare the blue beds of Lime in blue Clay, belonging to the yellow Lime Strata, see page 157, and so does the stream first mentioned at Walls near Knitaker, &c.: and the branches of the Leen near Cinder-Hill in Nottinghamshire, seem to do the same thing, see p. 452.

The *Erewash* River falls into the Trent at Barton-Ferry, in a wide Excavation in Red Marl, partly filled with sandy Quartz Gravel: about a mile below Sandiacre, hills of Red Marl commence on each side, and continue, with the Gravel flat in the bottom of the Valley, to Stapleford-Mill, where the great Derbyshire Fault (see page 146) crosses this River, and its Excavation, which is then very wide, proceeds in the upper part of the Coal Series greatly raised, until somewhere about the Road from Ilkeston to Cossall, where the zig-zag Fault also crosses (see page 162), and the Excavation then continues in lower parts of the Coal Series, not yet completely explored, until opposite the mouth of Golden-Valley at the N E corner of Codnor-park, where it enters the skirt of a curious local Denudation (see page 164), which in about a Mile it leaves again, and continues to ascend the series of strata until near Langton Hall in Kirkby, Nottinghamshire; where it again crosses the zig-zag Fault, and the Excavation ascends the Coal Strata basseting from under the yellow Lime, which also it at length intersects, south of Kirkby, crosses its blue beds and Clay, and originates on the N E of Kirkby, near to the edge of the Sherwood Forest Gravel.

The *Nutbrook* Rivulet falls into the Erewash S of Trowel, and has a wide Excavation in the upper part of the Coal Series for ½ *m.*, when it intersects and follows the line of the zig-zag Fault to near Kirk-Hallam, and then enters on a lower part of the Series: it originates on Coal-measures W of Heanor.

The *Mease* River falls into the Trent north of Croxall, in a wide Excavation in Red Marl partially filled with sandy Quartz Gravel, which extends up the Vale of the Mease a little above Croxall, from whence the Vale is excavated in Red Marl, with occasional patches of Quartz Gravel on it, sometimes in Derbyshire and sometimes in Leicestershire, to near the Aqueduct-Bridge at Hot-Wharf, WSW of Measham, near which a great Fault is crossed, and the Excavation enters the Ashby-de-la-Zouch Coal-Field, and in which it is cut, principally in a Red Clay, on which this River originates, on Smithsby Common N of the Town.

The *Sence* is a River of Leicestershire, which falls into the Anchor N of Atherstone, and whose waters are conveyed thence by means of the Tame, into the Trent, which is here mentioned, on account of its draining the detached parish of Ravenstone belonging to Derbyshire, in which the Valleys are mostly excavated in Red Clay belonging to the Ashby-de-la-Zouch Coal-Field.

The above description of the Beds or lowest Excavations of the principal Valleys in and near Derbyshire, will I trust be found useful, and important to observers of the Stratification and Minerals, of this curious District: it would have been desirable, to have mentioned the series of Strata in the sides of the Valleys in more instances, but for the unavoidable attention to brevity in this place, yet as the tops of the Hills are ascertained in so many places, by the List at page 16, and the sides of the more remarkable Valleys, by the List, page 61, it is hoped that no serious difficulties will occur, to prevent the understanding and examining of the explanation which I have offered herein, of the Subterranean Geography of the District, novel and difficult as the attempt may appear.

The Rivers of Derbyshire are tolerably supplied with *Fish*, as will be further noticed in the beginning of Chap. XVI. : they are not much infested by *Weeds*, owing to the rapidity in the currents of most of them, yet none of them are permanently thick or discoloured.

It has been often remarked, that some of the Rivers of this District are *warmer* than usual, and rarely freeze, the Derwent in particular, owing as it is said, to the many warm Springs which vent into them: when however the very inconsiderable quantity of such warm Spring Water and its small elevation of temperature is considered, as also, that there is nothing like a general warmth perceivable in the Strata any where, as those fond of deriving Toadstone and every thing else from subterranean Fire have pretended (see p. 275), it seems more natural to refer the circumstance, as far as it is true, to the great depth and narrowness of the Valleys, preserving the temperature longer than in more open situations.

After long dry weather the Rivers and Brooks here, as might be expected with such rapid falls, suffer considerable *Droughts*, and are quite dried up often, in places where at other times the torrents are tremendous: a remarkable drought is recorded in the year 1661, in which it was said, but not truly I think, that the Derwent was dried up at Derby. See an account of the fluctuation of the Rain at Chatsworth in the last 50 years, at page 99.

It has been remarked, that considerable *Floods* usually follow Rain with the wind blowing down the course of the Rivers. The Dove seems particularly subject to sudden Floods, which inundate its fine expanse of Meadows. Under this head it may be proper to mention, that in 1587 the Derwent was greatly swelled by a Flood, which carried away St. Mary's Bridge: in 1610, and again in 1673, the Morledge was so swelled by sudden Rains, as to do much damage in Derby: Nov. 5, 1698, the Derwent was greatly flooded: also on the 21st of November, 1791*, when it carried away Toad-moor Bridge above Belper; on the 11th of February, 1795†, the same bridge, and those at Watstanwell above it and Belper below it, were washed down; in the night of the 17th of August, 1799‡, the Derwent at Matlock Town rose rapidly, to a most surprising height: in February 1805§, the Trent was unusually flooded.

The lower parts of the Derwent and the Trent are in some places *Embanked*, as will be further noticed in Sect. 2, of Chap. XIII.: and the Banks of the Rivers and Brooks have in some instances been sloped and improved, as will be mentioned in Sect. 1, of Chap. XII.

In some of the Rocky Districts of Derbyshire, there are *Water-falls* or natural Cascades in the Brooks and

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* The Register kept of the Rain at Chatsworth, on this River, of which I have given an account at page 99, in the Week preceding this Flood, was as follows, viz. on the 14th = .173 inches, 15th = .141, 16th = .494, 17th = .058, 18th = .378, 19th = .612, 20th = 2.062, and 21st = .074, total of the week 3.992 inches.

† In the Week preceding this Flood, the Rain at Chatsworth was as follows, viz. on the 9th = .274 inches, 10th = 1.184, and 11th = .133, total 1.591 inches.

‡ The Rain of the previous Week was, on the 9th = .541 inches, 10th = .248, 11th = .037, 13th = .036, 15th = .052, 16th = .118, and 17th = 1.403, total 2.435 inches.

§ The Rain at Chatsworth in the first Week of this Month was, on the 4th = .357 inches, 5th = .500, and 8th = .901, total 1.758 inches.

Rivulets, in wet times, or falling into chasms or Water-swallows, as mentioned page 295; these I noticed, at

Alport Town, in the Lathkil, on Tufa and 1st Lime. See page 458.
Edale Chapel N, near Castleton (the Font), on 1st Grit.
Grindlow near Eyam, into Dowse-Hole, in 1st Lime.
Kinder N E, near Hayfield (Down-fall, or old-woman brewing), on 1st Grit, very high and romantic.
Lumsdale, N E of Matlock, on 1st Grit, high and romantic.
Monyash E, Ricklow Dale, on 1st Lime.
Over-Haddon S, in Lathkil, on 2nd Lime, see p. 475.
Peak-Forest S (Dam-dale), on 3rd Toadstone.
Phoside S, in Glossop, on 1st Grit.
Stoney-Middleton (Mill), on 1st Lime.

There is an artificial Cascade constructed formerly at very considerable expence on the S E side of Chatsworth House; one on the S W side of Lyme-Hall, near Disley, Cheshire; and another is shewn to the visitors of Castleton, in Speedwell Mine.

I shall close this account of the *Rivers* in Derbyshire, by an alphabetical List, of those above enumerated, with the portion of Derbyshire, nearly, which each drains, viz.

	Acres.
Amber (except a part in Notts.)	31,000
Ashop	13,000
Bootle	8,000
Bradford and Lathkil	20,000
Dane (upper part)	580
Derwent (except a part in Yorkshire)	111,500
Carry forward	184,080

Doles

	Acres.
Brought forward	184,080
Dolec (except a part in Notts.)	15,000
Dove (only the E side)	81,000
Ecclesburn	15,000
Erewash (only the W side)	17,000
Ethrow (only the S side)	10,000
Goyte (only the E side)	31,000
Hipper	7,000
Idle (upper parts)	21,000
Mease (intermixed with Leicestershire)	16,000
Morledge	13,000
Noe	15,000
Nutbrook	10,000
Rother (upper parts)	45,000
Schoo	10,000
Sence (in Ravenstone)	2,000
Sheaf (upper part)	5,000
Shelf	10,000
Trent (middle parts)	70,000
Wye	45,000
Total of Derbyshire	622,080

2. *Lakes.*

Neither Derbyshire or its environs furnish any natural Pools of Water deserving of the name of Lakes, nor is there the least appearance of deep Lakes which have been filled up, either by *native* Gravel (see p. 132) and earthy deposits, or by the growth of Peat: the Valleys, contrary to Mr. Whitehurst's too confident expressions on the subject (p. 473, Note), have not the Strata in their bottoms broken, and deep "horrid chasms" there, filled with adventitious matters, which otherwise would have been deep Lakes: nor have I noticed or obtained information of Sinkings in any places, where the Valleys appeared to have had any great inequalities in the original plane of their bottoms, or in other words, they have no deep local deposits of Gravel, &c. which occupy the places of ancient Lakes. The great deposits of Quartz Gravel in the Vale of Trent, and all its connecting Valleys to the same level nearly, appears to me, no thicker than to fill up the original and regular descending Excavation of this Valley, into the Humber and the Ocean: towards which the depth of Alluvia, Silt, and Peat gradually increases in depth or thickness: it must have been owing to Shafts accidentally sunk in wide Faults which cross the Valleys, or in those which in some rare instances range along the Valleys, which gave rise to the above opinion of Mr. Whitehurst, so contrary to that of all practical Miners whom I have consulted, in a series of enquiries and observations expressly directed to this important subject, see the Philosophical Magazine, vol. 34, p. 49.

3. *Ponds.*

In the Rocky Limestone Districts of Derbyshire, which are coloured Vermillion Red and Orange in the Map of Soils and Strata, facing page 97, the Farmers and Inhabitants set great store by certain ancient Ponds or Meers of Water, which rarely if ever fail, and yet few of them have any perceptible Stream running from them: few of these Meers exceed an Acre, and many of them are less than a Rood in extent, and generally are but a few feet deep in the middle or deepest part. It seems to me, that most or all of these are the work of art, in part at least, in deepening the bottom and raising

ing a head, where a slight Spring and natural wet flat place appeared, either on the basset of one of the Toadstone Strata, or on alluvial patches of sufficient extent and tenacity to catch and hold up the Rain-waters. The period when these Meers were made is probably very distant, the tradition even of which is lost, and they are generally considered as natural Meers or Pools of Water. The following is a List of Places where I observed these *ancient Meers* of Water, viz.

Alsop, 1 *m.* N NW, on Alluvia on 4th Lime.
Blackwall (Pilwell), N N E of Chelmerton, on alluvial Toadstone.
Brassington N, on Alluvia on 4th Lime.
Bonsal NW, on 3rd Toadstone.
Church-Sterndale Town, on Alluvia, on 4th Lime.
Copt Houses E, E of Peak Forest, 2 Meers, on 3rd Toadstone.
Cronkstone S E, in Hartington, on 3rd Toadstone.
Elton E (Exlow), on 1st Toadstone.
Fairfield N E, on 3rd Toadstone; and 1 *m.* E (Waterswallows), on ditto.
Gratton SW (Kinnow), on 2nd Toadstone.
Heathcote W, in Hartington, on loamy Alluvia.
Hurdlow W, in Hartington, on 3rd Toadstone; and NW, on ditto.
Hurdlow-House N, in Hartington, on 2nd Toadstone.
Meadow-place S E, on 1st Toadstone.
Middleton by Yolgrave, ¾ *m.* SW, on 2nd Toadstone.
Monyash Church W, on 1st Toadstone Clay; ½ *m.* E (Dunnage), on Alluvia, on 1st Lime; and 1¼ *m.* N E (Hunter's), on Alluvia, on 1st Lime.
New Haven S E (Cardale), on alluvial Clay, on 4th Lime.
Over-Haddon, ¼ *m.* E, on alluvial Clay and Toadstone.

Pike-hall E, near Elton, on 3rd Toadstone.
Pilsbury E (Dale), on Alluvia, on 4th Lime.
Small-dale, 1 *m*. SW, near Peak Forest, on 3rd Toadstone.
Smerril-grange E, on 1st Toadstone; and SW on 2nd Toadstone, near Elton.
Taddington, ½ *m*. S (High), on Alluvia, on 2nd Lime.
Tideswell NNW (Black-hillock), on 3rd Toadstone.
Whestone E (Cross-gate), near Tideswell, on 2nd Toadstone.

&c.

On the E of Bramcote, and N E of Leek in Staffordshire, on the western edge of a high Hill of Limestone-Shale, is a small Peaty Meer or Pool of Water, called the Black-Meer of Moredge (or Morridy, according to Dr. Plott), respecting whose unfathomable depth and other wonderful properties, the most absurd falshoods were long propagated: it occupies the place of a large and ancient *Slip* from the side of this Hill (p. 75): a short time ago the charm of this spot, so celebrated among old Women who never were there, was broken by a sturdy Labourer, who in a few hours, for a wager, dug a trench through the edge of Shale and Peat, and emptied this pretended unfathomable Pit!

In the dry Rocky District above mentioned, the Farmers at a distance from the Brooks, or the natural Meers of which I have spoken above, have anciently been in the habit of making *artificial Meers*, or Cattle-Ponds, in their Pastures, the number of which have been greatly multiplied, since the almost general Enclosure of the Commons in this District.

An opinion seems to have prevailed with many persons, that Meers should be made on the round or projecting points of Hills, rather than in the slight Vales between or near their summits; but Mr. Joseph Gould, who has been at great pains in providing this essential convenience on his Farm at Pilsbury, pointed out to me numerous instances where Meers, otherwise well made, in the parish of Hartington, were frequently in want of Water.

The practice of this Gentleman is, to fix on hollows or slight Vales, for the places of his Meers, which done, Men with Wheel-barrows are set to dig out and form the Meer, by removing the soil and rubble Rock, and the firm Rock also, if necessary, from the upper side and edges, and laying it in a wide and regular circular Bank, with a very wide base and easy slopes, at the lower edge of the intended Pond, in such a manner, that a circular hollow from 10 to 20 yards across, according to circumstances, with an edge level all round, except that the new raised Bank is made somewhat highest where most raised, to allow for the settling of the Earth, and the sides slope regularly into the middle, where the depth is 3 to 3½ feet. When this dish-like bottom is brought to a regular shape, and all the large stones on it are broken or removed, a layer about five inches thick is spread all over it of Lime-ashes, that is, refuse slacked Lime and Coal Cinders from a Lime-kiln, and the same is well trodden down by Men, or beat by wooden rammers. On this a stratum of well-tempered Water-Clay (see page 455), about four inches thick, is spread, and well rammed or beaten down; then a second bed of Clay about the same thickness, is spread over all the bottom, and well rammed down upon the first, and while this last coat of Clay continues in a yielding state, the whole of the bottom and edges of the Meer is paved with Rubble Stones, and on this a covering of very small Rubble Stones or Gravel is spread, several inches thick, and the Meer is then ready to receive the Water of the first heavy shower which falls: and as soon as this happens, it is Mr. Gould's practice, to plough out a slight furrow in the grass, in a direction each way, to suit the slope of the Hills, and preserve a slight fall all the way to the Meer, turning the turf to the lower side, which furrows occasion the Meer quickly to fill: and this process he repeats on the approach of Rain, whenever the Meers are low of water in the summer, turning in the furrows again, as soon as the Rain subsides or the Meer is full, to prevent an accumulation of sediment by water running through it: by which precautions, his Cattle are constantly supplied with excellent Water on these very high and rocky Pastures.

Upon the high East Moor, on the south side of the very ancient Grindstone Quarry in Ashover, which is noticed as such in the Doomsday Survey of William the First, a very entire artificial Pond was discovered in 1808, almost concealed under Peat, in making a Drain in Sir Joseph Banks's new Plantations; the head or artificial Bank of which was *puddled* in the centre, in a very complete manner, no ways differing, apparently, from what has been erroneously said to be a modern art, introduced on our Canals by Mr. Brindley. The situation of this Pond, close to the ancient Road which led to this Grindstone Quarry, leaves no room to doubt, but it was constructed for the use of the Cattle, employed to carry Grindstones from this inhospitable Moor into the South Country.

The making of *Drinking-places* for Cattle, is much attended to by the Farmers of Derbyshire, and hewn Stone Cisterns (see page 433) are placed in most Cattle

Yards, and in a large portion of the Fields, where the Springs on the sides of the Hills admit of supplying them, even the Commons were early supplied with these, in many situations: the sides of the public Roads are also well supplied with this essential convenience to Travellers. Mr. George Toplis, in draining his allotment on the Green in Brassington, on Shale, has made some very complete Watering-places, by fixing long Stone Cisterns, 18 inches wide and 9 inches deep, in the line of his Under-drains, and sloping away the ground and paving the easy descents to them each way, by which means the Cattle can approach the water, from either side, and are not liable to be injured by a master Beast, attacking them while drinking, but can readily escape across the Cistern. Mr. John Blackwall, of Blackwall, in draining his Farm, on Shale, has conducted the Drains to proper places for Cisterns by the Fences, causing the water to enter at one end just level with the surface, and pass off at the other; and finds, that the constant change and agitation of the surface of the water by this stream across it, prevents freezing in the severest weather, a thing of much importance to the health of Cattle. In Mr. Henry Smith's very spirited improvements, on his Farm at Norris Hill, in Ashby Wolds, Leicestershire (see Mr. Pitt's Report, pages 25, 84, 183, &c.), Stone Cisterns, procured by the Canal out of Derbyshire, are placed in the lines of his neat clipt Quick Hedges, so as to supply two Fields, and where necessary, the water is brought to them out of the Under-drains in thin Zink Pipes, as being cheaper and perhaps more durable than Lead in such situations: these Pipes are manufactured for sale at Derby, as will be further noticed in Sect. 8, of Chap. XVI.

The *Reservoirs* and large Mill and Fish *Ponds* which I have noticed in the District, are as follows, viz.

Armfield N, near Mottram, Cheshire, a Reservoir for the Huddersfield Canal, broken down.
Barlborough N E, 4 Reservoirs for the Chesterfield Canal; and NW, 4 Fish Ponds.
Blackbrook, on Charnwood Forest, Leicestershire, a Reservoir for the Leicester Canal.
Blidworth N, Notts. a large Fish Pond.
Bradley S, a Fish Pond.
Bretby, S and E of Bradby-Hall, Fish Ponds.
Butterley NW, near Pentrich, a large Reservoir for the Cromford Canal.
Calke N, Fish Ponds.
Carlton W, Notts. Fish Ponds.
Chapel-en-le-Frith SW (Combs-brook), a Reservoir for the Peak Forest Canal.
Chatsworth Park, SW of Edensor, Fish Ponds in the Derwent; and E, 2 Reservoirs in the Old Park.
Church Gresley N E (Milk-hill Pool), old Mill Pond.
Clipston W, Notts. a Fish Pond.
Cuckney N E, Notts. (Forge), Mill Pond; and WSW, a Mill Pond.
Darley WNW (Flash), a Reservoir for Toad-hole Mills.
Disley W, Cheshire, Fish Ponds.
Eggington SW, Fish Ponds, in the Dove.
Foremarke N, a Fish Pond.
Foston S, near Sudbury, a Fish Pond.
Golden Valley, N of Codnor-park, 2 Reservoirs for the Cromford Canal.
Greasley NW, Notts. a Reservoir for the Nottingham Canal.

Grooby N W, Leicestershire (Pool), Mill Pond.

Hardwick, W and N E, in Alt-Hucknal, Fish Ponds.

Harthill S W, Yorkshire, 3 Reservoirs for the Chesterfield Canal.

Kedleston E, large Fish Ponds in the Morledge.

Kelstedge W, in Ashover, a Mill Pond.

Locko Park, near Chaddesden, a Fish Pond.

Longford S E, a Mill Pond.

Loscoe E, near Heanor, a large Mill Pond.

Lyme-park, near Disley, Cheshire, Fish Ponds.

Mansfield SW, Notts. 3 or 4 Mill Ponds.

Markeaton S E, a Fish Pond in the Morledge.

Melborne S, a Mill Pond.

Mellor WSW, in Glossop, Cotton-Mill Pond.

Nether Langwith E, Notts. a Fish Pond in the Palter: and W (Old Furnace), Mill Pond.

New Brampton WSW, near Chesterfield, a Mill Pond.

Newstead Abbey, N W and S, Notts, Fish Ponds.

North Winfield S (Park), Mill Pond.

Nuthall S, Notts. Fish Ponds.

Osmaston SW (Cottage), Fish Ponds.

Overseal N E, Leicestershire (Barrat Pool), Mill Pond; and N W (Union), Reservoir for the Ashby-de-la-Zouch Canal.

Peak Forest S E, a Mill Pond.

Pentrich S W, a Mill Pond.

Pinxton S, a Mill Pond.

Radburne WS W, a Fish Pond.

Renishaw SW, a Fish Pond.

Repton S (Park), Fish Pond.

Rudyard Vale, N W of Leek, Staffordshire, a very large Reservoir for the Caldon Branch of the Trent and Mersey Canal, nearly on the Grand Ridge!

Sandbeck Park, near Tickhill, Yorkshire, Fish Ponds.

Sheffield W, Yorkshire, Reservoirs for the Waterworks.

Shipley NW, large Fish Ponds.

Shire-Oaks SW, Yorkshire, near Worksop, Fish Ponds.

South Winfield N E (Toad-hole Furnace), Mill Pond.

Stanesby S, in Smalley, a Mill Pond.

Staveley W (Forge), Mill Pond.

Sudbury S, a Fish Pond.

Sutton N, in Scarsdale, Fish Ponds.

Swanwick SE (Delves), Pond.

Swithamley S S E, Staffordshire (Turner's Pool), Fish Pond, on the Grand Ridge!

Tapton W, near Chesterfield, a Fish Pond.

Welbeck S E, Notts. a large Fish Pond.

Wentworth Castle E, and S E, Yorkshire, large Fish Ponds.

Wentworth Chapel N, Yorkshire (Elsicar), Mill Ponds, and SW, large Fish Ponds.

Willesley W, near Measham, a Fish Pond.

Wingerworth (Park), Fish Ponds; and W (Stabbing), Fish Ponds.

Woodhall NW, Yorkshire, 2 Reservoirs for the Chesterfield Canal.

Woodthorp S E, in Staveley, a Mill Pond.

Worksop Manour S, Notts. a Fish Pond.

On the subject of *Fish*, I shall have some further observations to make, in the beginning of Chapter XVI.; and in Section 3, Chapter XII., the uses to which the *Weeds* of Ponds are sometimes applied in this County, will be mentioned.

4. *Springs.*

The numerous alternations of porous and water-tight Strata, and patches of Gravel covering them, which occur in this District, the many Faults intersecting the Strata which are filled with water-tight Fault-stuff, and the depth of the excavated Valleys, occasion numerous Springs of Water to burst forth, some of which are remarkable for their very great and constant streams of pure Water, others for their variable or temporary appearance, and being very turbid after Rain, where supplied from the Swallow-holes mentioned page 295, or for their intermitting; others again, though small in their supply of Water, are remarkable for their occurrence in rocky, high, and porous Districts; others for their rising in artificial Wells or boreings, and overflowing the surface, in a stream; some are remarkable for emitting warm or hot Waters, and not a few for their Mineral Impregnations, viz. Calcareous, Chalybeate, Ferruginous or Ochrey, Sulphureous, Bituminous? Saline, &c.; for their deposits of Tufa, called Petrifying (see p. 457), and of Ochre (see p. 402).

Few subjects are of more practical importance, than the Theory and knowledge of *Springs*, to the Miner and the Agriculturist, who want to discharge them from the interior or the surface of the Ground, to the Civil Engineer, the Miller, or the Inhabitants, who want to discover and collect them for the supply of Canals or Mills, and for domestic and rural purposes; and yet few subjects have been incumbered with more wild and fanciful Theories, or been more superficially treated by Authors. That filtration of the Rain Waters through porous Strata, till interrupted and thrown out by other water-tight Strata or Faults, is the original cause of all Springs of Water, is doubted or questioned by no practical Miner, Well-sinker, or intelligent Drainer; and of which, no subject that I am acquainted with in Nature, admits of stronger or more conclusive evidence: the intelligent Collier discovers, that the quantity of Water coming into his Works, is just proportioned to the Rain Waters which are suffered to soak into his basset-measures, see p. 351, and in the neighbourhood of numerous deep Mines or Coal-Pits, the Inhabitants find every Spring, however permanent or powerful previous to the commencement of these Excavations, dry up and disappear, except a few, issuing out of Gravel resting upon Clay, or local patches of porous Strata so situated, and without connection with the Strata penetrated by the Shafts, Soughs, or Workings of the Miner, or where Faults occur, which completely intersect and divide the piles of Strata by walls of Clay. Instances of these effects of Faults in holding up Springs, may be seen in a remarkable degree, at Stanton-by-Dale Hall, which stands on the great Derbyshire Fault, see p. 146; in the vicinity of Denisthorpe and Oakthorpe Collieries, in Measham; at Ilkeston Hall, and other places which are noticed in the following List. In Section 1, of Chapter XII. this subject will be resumed, in treating of Draining.

In the driving of Stoke Sough, near Stoney Middleton, so much Petroleum or Rock-Oil was liberated by the workings, as to occasion a film of it at times on the Water, which was called a *Burning Spring*, as mentioned p. 467; but I believe that no spontaneous or natural discharge of Bitumen, or inflammable matters, occur in the Springs of this District.

The following is an Alphabetical List of the notable *Springs of Water* in or near to Derbyshire, viz.

Aldwark W (Ducket-wall), on 3rd Toadstone.

Allestry Town, on the great Derbyshire Fault, see p. 146.

Alport, near Yolgrave, Petrifying formerly, at the great Bakewell Fault, see p. 457, and 290 Note.

Alton S E, in Ashover, Ochrey and Corrosive, in 3rd Coal-shale.

Annesley N E, Notts. (Mosely, Joan-slut, and Hollin), from Gravel.

Ashover, Chalybeate, from Shale; S W (Lexley), dried up.

Astbury S, Cheshire (Hallow-Green), Ochrey, on a Branch of the great Derbyshire Fault, see p. 147.

Bakewell Town (at W. Watson's), warm Chalybeate, a Bath formerly.

Ballidon S E (Hipple), large, temporary, in 4th Lime, near the great Limestone Fault, see p. 283.

Barmoor NW, in Peak Forest, Intermitting, see p. 288.

Beresford Hall, Staff. near Hartington (Warm-will), Bituminous? formerly, by the great Limestone Fault, p. 286.

Berley in Eckington (Spa), Chalybeate, an open Bath formerly; E (Moor-Sough), Ochrey and Corrosive.

Blackfordby Town, near Ashby-de-la-Zouch, Leicestershire, large.

Bradley S, Chalybeate, near the great Derbyshire Fault, see p. 146.

Bradwell S (Well-head), large, out of Moss Rake; N (Edingtree), warm, Salt; and E, Sulphureous, on Shale.

Brassington (Thacker-well), Sulphureous; and NE (Harboro-well), on 3rd Toadstone.

Bredsall SW, Ochrey, near the great Derbyshire Fault, see p. 146.

Bretby SSW (Decoy Wood), Petrifying, from yellow Lime? see p. 158 and 174.

Brough, near Hope, warm Chalybeate, in Shale.

Bug-Norton, near Congleton, Cheshire, Sulphureous, on a Branch of the great Derbyshire Fault, p. 147.

Buxton Town, hot, 82°, and Baths; Chalybeate, 52° to 55°, in Shale, these on opposite sides of the great Limestone Fault, p. 287: W of Buxton, Cold, and a Bath; and (Wye-head), on Fault, see p. 286.

Castleton, Chalybeate; and SW (Rushop or Russet), very large, at the great Limestone Fault, p. 288.

Chelmerton NE (Five-wells), on 2nd Toadstone.

Chesterfield Town E, Chalybeate, 10th Grit Rock.

Church-Lawton NW, Cheshire, a Salt Spring and Works, Red Marl, see p. 147.

Cowley, SW of Dronfield, Sulphureous, an open Bath.

Crich W, by a Fault, see p. 242.

Cromford Town (Sough), large, warm, from Gang and Bage Mines, &c. see p. 329.

Crowdycote in Hartington (Crowdwell), large, near the great Limestone Fault, p. 286.

Derby, in St. Alkmund, Allsaints, St. Michael, and St. Peter, overflowing Wells, in Red Marl.

Donisthorpe, ¼ *m.* W, in Measham, a Salt Spring in the Coal-Pit, near the Red Marl.

Dove Dale, N of Lover's Leap, near Hanson-grange, large, in 4th Lime, see p. 297.

Duffield (Fishpool-flat), 2 Chalybeate.

Eccles in Chapel-en-le-Frith (Mr. Goodman's), artificial ebbing and flowing Well, see p. 288, Note.

Ecceshall Barlow N, Yorkshire (Grey-stones), Chalybeate.

Ecclestor (or Eaglestor) in Yolgrave, Chalybeate, in Shale.

Edale Chapel SW (Barber Booth), Ochrey, in Shale.

Flagg Town, near Monyash (Wells), on 2nd Toadstone.

Grange-mill N, near Winster (Shothouse), on 2nd Toadstone.

Hargate-wall E, in Wormhill, and ¼ *m.* NW, on 2nd Toadstone.

Hartington NW, on Castern Low (Well), on 4th Lime Wayboard? p. 298.

Heage W (Nether-end), Chalybeate, in 3rd Coal-shale.

Hope, Chalybeate, in Limestone Shale.

Horton NW, Staffordshire, Ochrey, on Fault.

Hurdlow SW, in Hartington, on 3rd Toadstone.

Ilam S, Staffordshire (Manifold), in the Garden; and SW (Hamps), very large, in 4th Lime, near great Limestone Fault, see p. 283 and 285.

Kedleston Park, S E of the House, Sulphureous, Salt, 47° (Pilk. I. 272), a Bath, in Red Marl.

Kinder E, in Glossop, Ochrey, in Shale.

Kniveton S (Agnes and Mudge), Sulphureous, in Shale Limestone.

Little Longsdon W (Monsal-dale), Petrifying.

Litton SW, on 2nd Toadstone; and S E (Cressbrook-dale), Petrifying.

Loads W, in Chesterfield (Sida), pretended fattening, &c.

Ludwell S and N, in Hartington, very large, in 4th Lime; near the great Limestone Fault, see p. 286.

Matlock, Chalybeate, in Shale.

Matlock Bath (old Bath), Hot, 68°, and Baths; and (new Bath), Hot and Baths, by Faults.

Middleton by Wirksworth W (Boota), on 3rd Toadstone; and N NW (Wood), Hot, formerly, and an open Bath, in Bonsal Dale, p. 64.

Middleton by Yolgrave E (Well-head), large, in 1st Lime.

Millington-green E, near Kirk-Ireton, Sulphureous.

Morley-park, near Heage, Chalybeate.

Oakerthorpe in South Winfield (Sough), Ochrey.

Oakthorpe N, in Measham, an overflowing Coal-shaft.

Over-Haddon S (Wells), on Clay Wayboard; and SW, large, at great Bakewell Fault, in Robinstye Mine, p. 291 Note.

Parwich Town, temporary, from 4th Lime.

Quarndon Town, Chalybeate, 49¼°, near the great Derbyshire Fault, see p. 146.

Scarcliff SW (Palter-head), on yellow Lime.

Shottle in Duffield, Sulphureous, in Shale.

Simondley SW, in Glossop, Ochrey and Corrosive.

Slaley SW (Mary-grot), in Bonsal Dale, Petrifying, on 3rd Toadstone, p. 458.

Small-dale, SW of Peak Forest, in 4th Lime.

South Anston S, Yorkshire (Pecks-Mill), very large, in yellow Lime.

Stanfrey NW, in Bolsover (Shuttlewood Spa), Sulphureous, an open Bath, by the Zig-zag Fault, page 167.

Stanley, near Morley, Chalybeate.

Stoke W, near Stoney Middleton (Sough), warm, burning? see pages 467 and 501.

Stoney Middleton N E, warm, 63°, an open Bath, Petrifying, near a great Fault, ranging to Great Hucklow.

Taddington S (Wells), on 2nd Toadstone.

Tibshelf, Chalybeate.

Tideswell N N W, Intermitting, formerly; 1½ m. NW, on 2nd Toadstone; S (Dale), Petrifying.

Tissington Town, in Shale Limestone.

Toton N, near Atterburgh, Notts. Ochrey, overflowing a bore-hole, in Red Marl.

Troway S E (Sough), Ochrey and Corrosive.

Tunstead N W, and S S W, on 2nd Toadstone.

Wadsley, N W of Sheffield, Yorkshire, Ochrey, in 2nd Coal-shale.

West-Hallam E, Sulphureous.

Whittington E, Chalybeate, Sulphureous, in Coal-shale.

Wirksworth Church-yard, and SW, large, formerly, drained by Hannage Sough (page 329), a Bath formerly.

Woodlands in Hope, S E end of Doctor-Gate, Ochrey.

Wormhill S (Flag Dale), 2 very large ones, in 4th Lime, see p. 289.

Worthington S, Leicestershire (Griffe-dam), Chalybeate.

The particular nature or proportions of the mineral impregnations, in the Springs mentioned in the above List, I have not had the opportunity of enquiring into, but have set them down according to obvious appearances, or as they are reputed to be: much less shall I say any thing here on their Medicinal qualities: those who visit Buxton, Matlock Bath, or Kedleston-Inn, will be at no loss for publications setting forth their respective virtues, or for the advice of Professional Men who have especially turned their attention to these subjects, and to the proper regimen and treatment of invalids, to whom these Waters are likely to prove serviceable. I ought here however to acknowledge the kindness of Dr. Buxton, of Buxton, in communicating to me his observations on the great Fault which ranges through the Baths there (see p. 287), and the state of the Hot Springs, at the time that the foundations were digging for the Crescent, and other Buildings adjoining it, in the year 1781.

Deep *Wells* sunk for procuring of Water, are by no means common in the District I am describing, such being generally unnecessary, except in the hard Rocky Districts, where the expense of sinking is a serious bar to their adoption.

Before quitting the subject of Water, it may be right to mention the *Water-works* which I observed for the supply of Towns, or large Houses, in or near Derbyshire. These were, at Allsaints in Derby, where the Water is forced into Pipes for the supply of the Town, by a Water-wheel; near Sutton Hall W, in Scarsdale, a deep Shaft is sunk and a Steam-Engine used, for supplying the House and Offices, &c. Ilam House, in Staffordshire, is supplied by an ingenious bucket lever Engine. At Duckingfield, near Ashton-under-line, Cheshire, a Water-wheel supplies the Town and Hall; Sheffield, in Yorkshire, is supplied by great lengths of Water-pipes from the Reservoirs W, on Crooks Moor. Chatsworth House and Cascade, Fountains, &c. are supplied by large Reservoirs and Pipes; Leam House, in Eyam, is supplied by a long open Carriage for the Water and Pipes; and Stanton in the Peak House, by Pipes; and so is Ashover Town, Wirksworth, &c.

END OF VOL. I.

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